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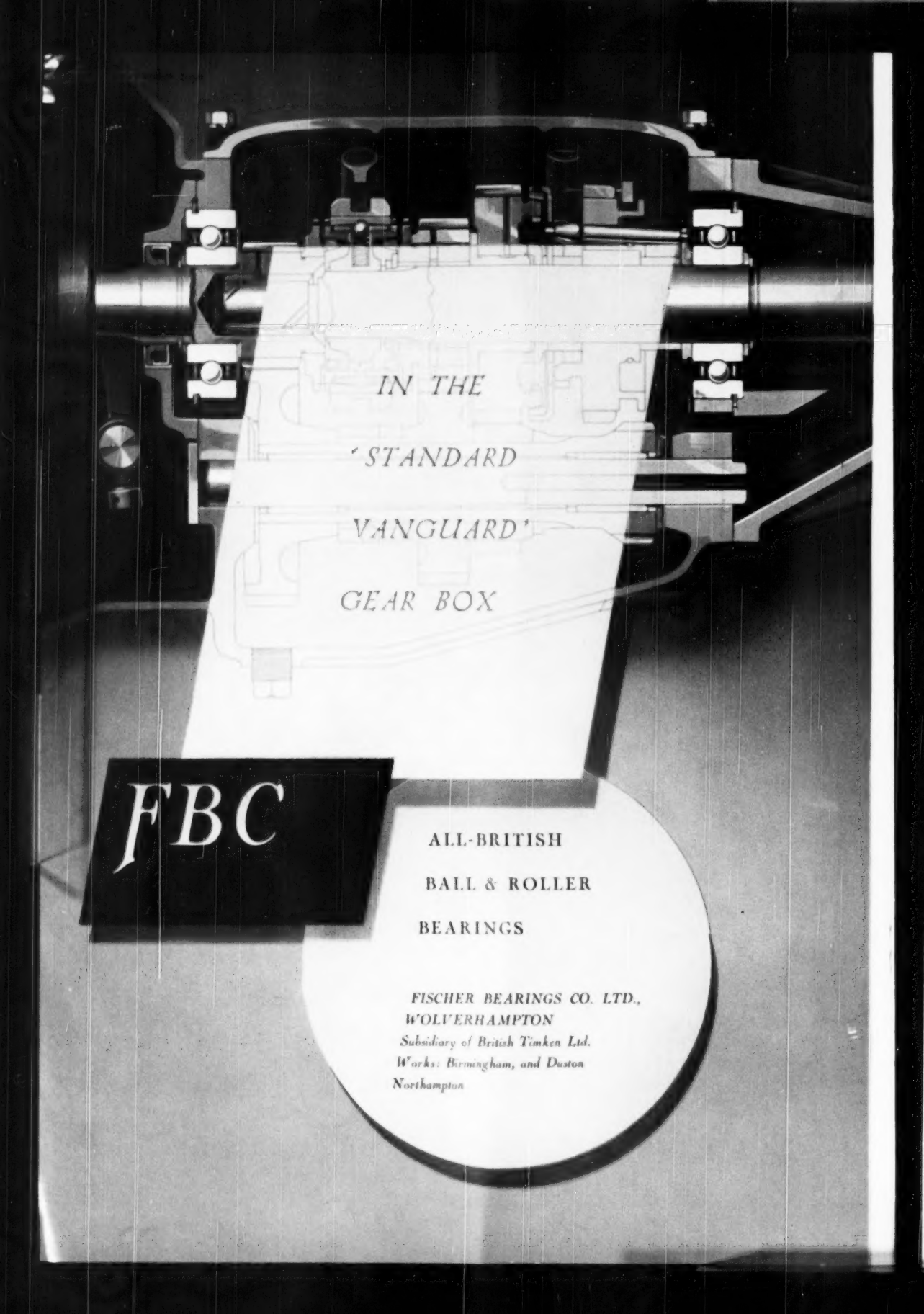
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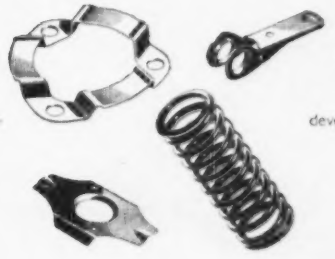

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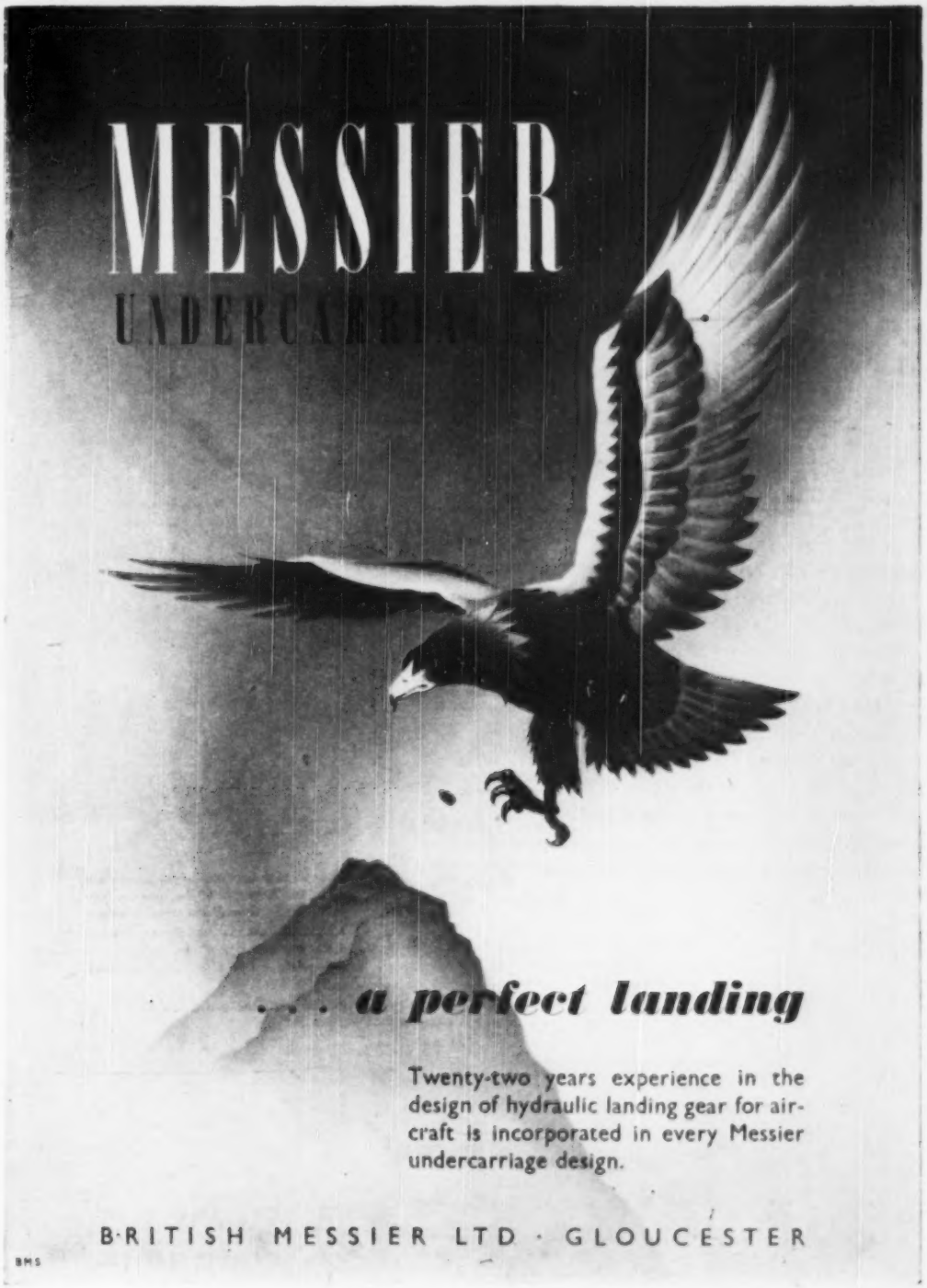
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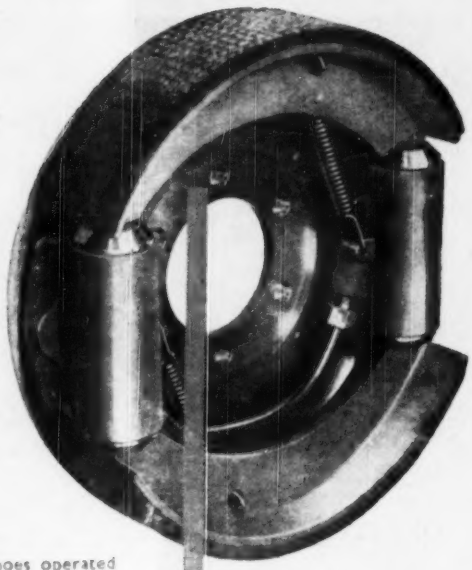

THIS brake consists of two self-aligning shoes operated by two wheel cylinders spaced diametrically opposite. Each wheel cylinder has two pistons of a different form: one having a slot at right angles to the axis of the bore, which operates the shoe when the brake is used in forward rotation and the other with the slot inclined at an angle to the bore which forms the abutment for the other shoe in similar condition. This inclined slot has a predetermined angle which allows the shoe to align itself accurately to the drum as well as forming the abutment. The total shoe reaction is transmitted via a shoulder on the piston to the cylinder body. By this arrangement, two-leading shoe operation is obtained in either direction, and greater power for a given input and greater stability is obtained.

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FARNBOROUGH

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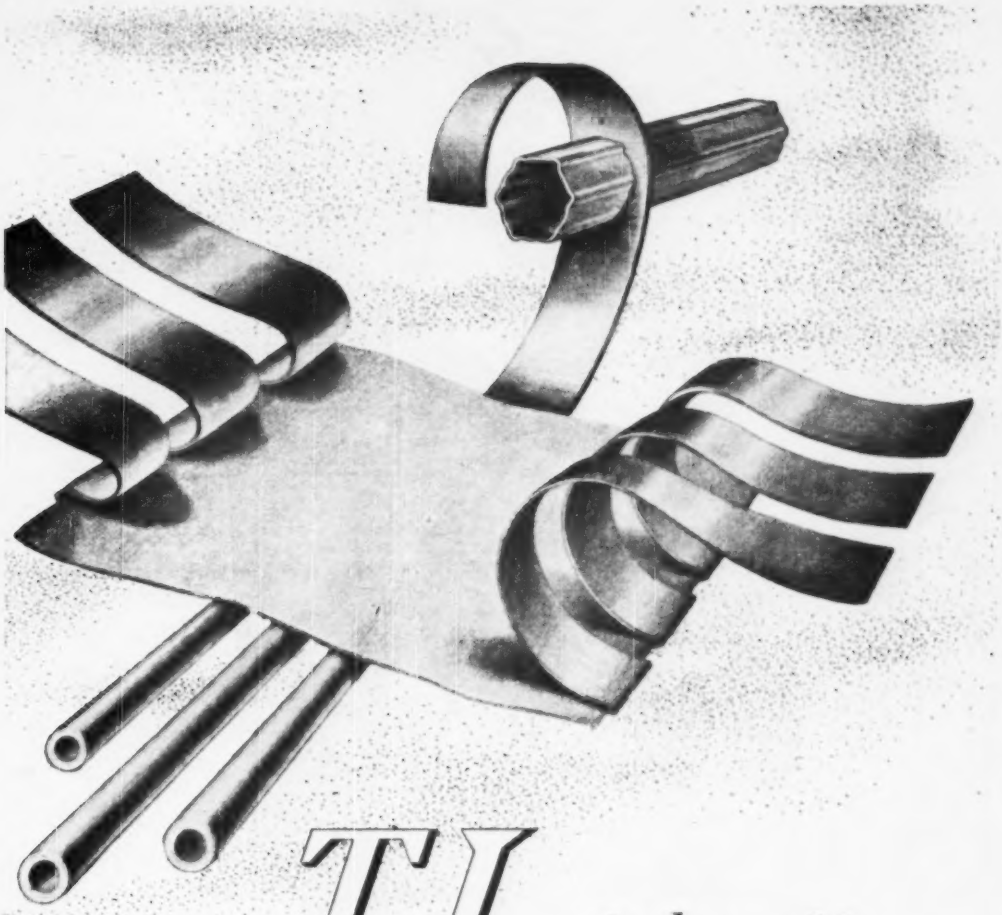

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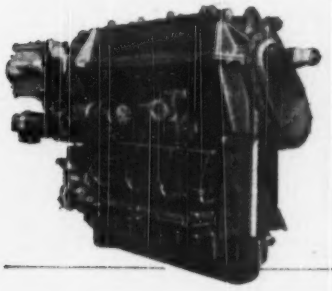
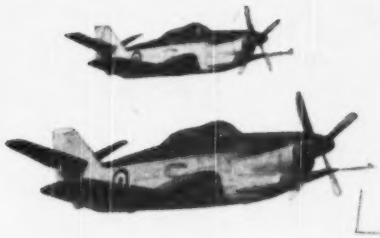
IN EVERY SPHERE OF AERONAUTICS...



BIG return of power in relation to weight is a main feature of the 180 h.p. Cirrus Bombardier. This direct petrol injection power unit is being widely specified by the Service and Civil Technician alike.



BIGGER potential striking power is provided for the Royal Navy by the Y.A.S. anti-submarine aircraft. This versatile, heavily armed machine which is powered by a Rolls-Royce Griffon Piston engine or Armstrong Siddeley Double Mamba Turbo-Prop Unit, has an exceptional operational performance.

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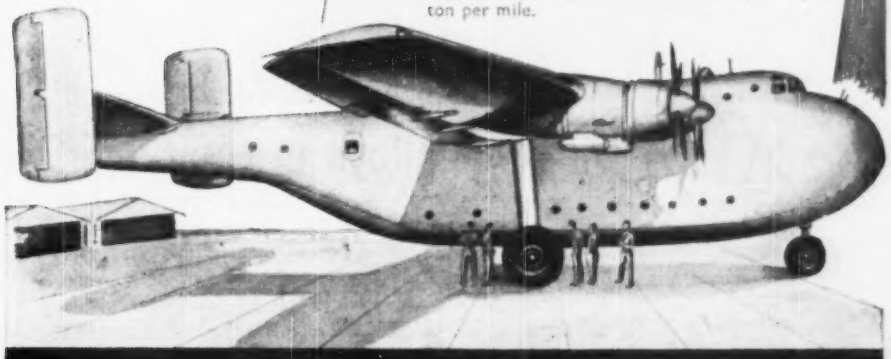

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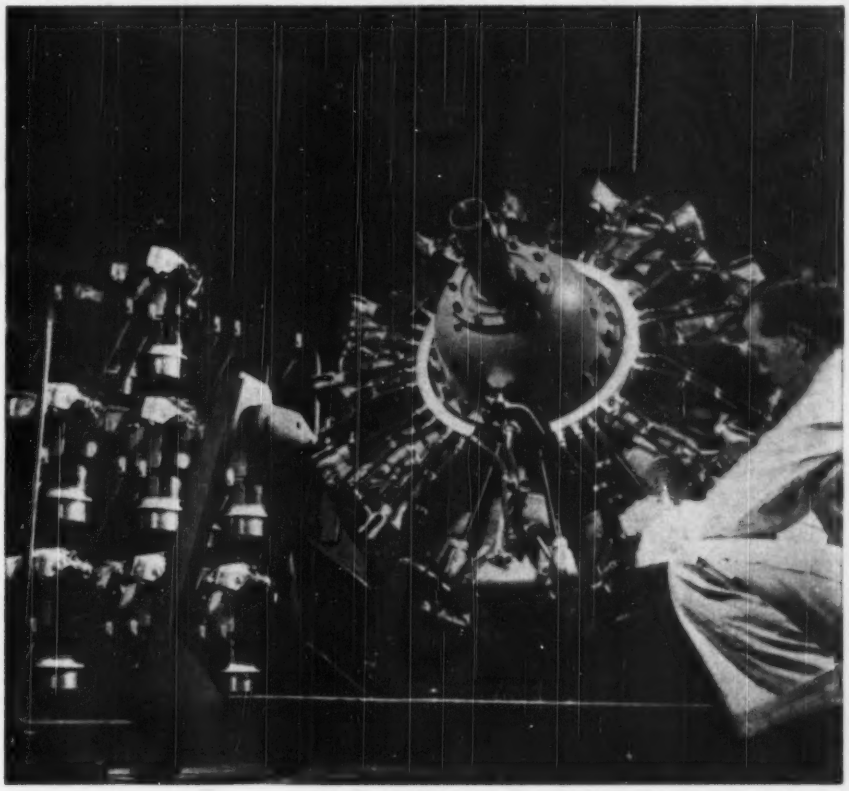

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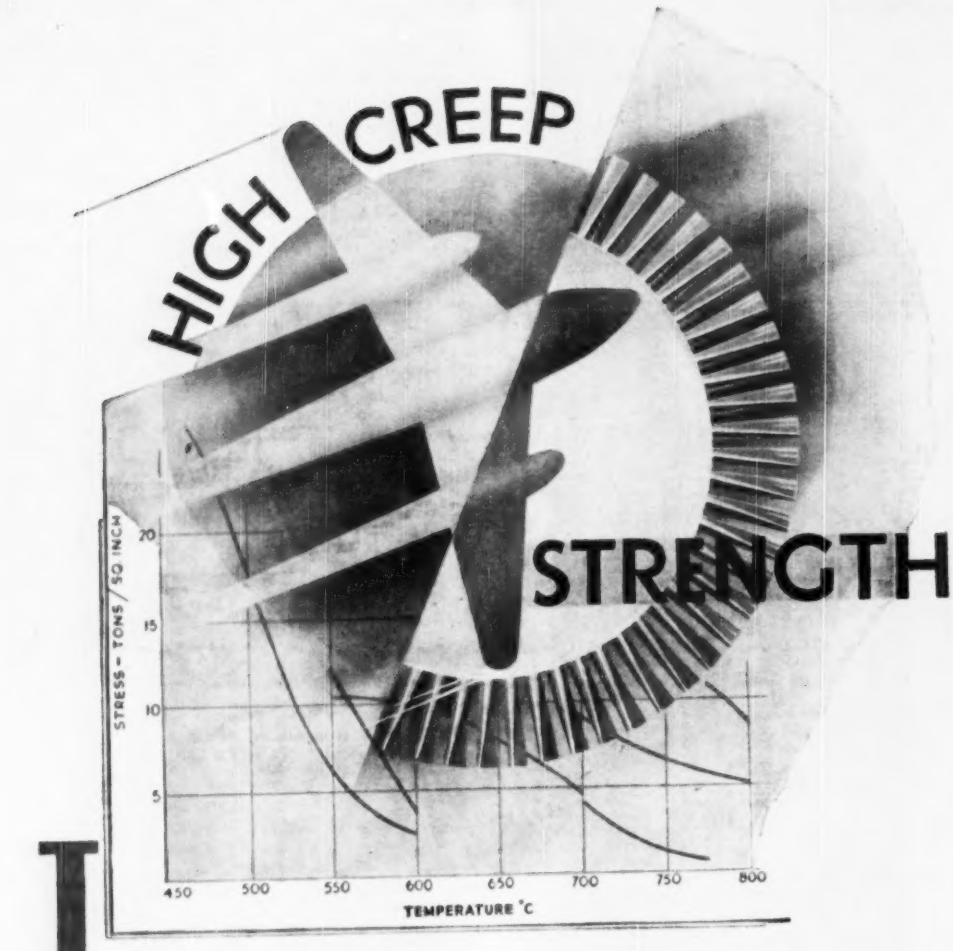

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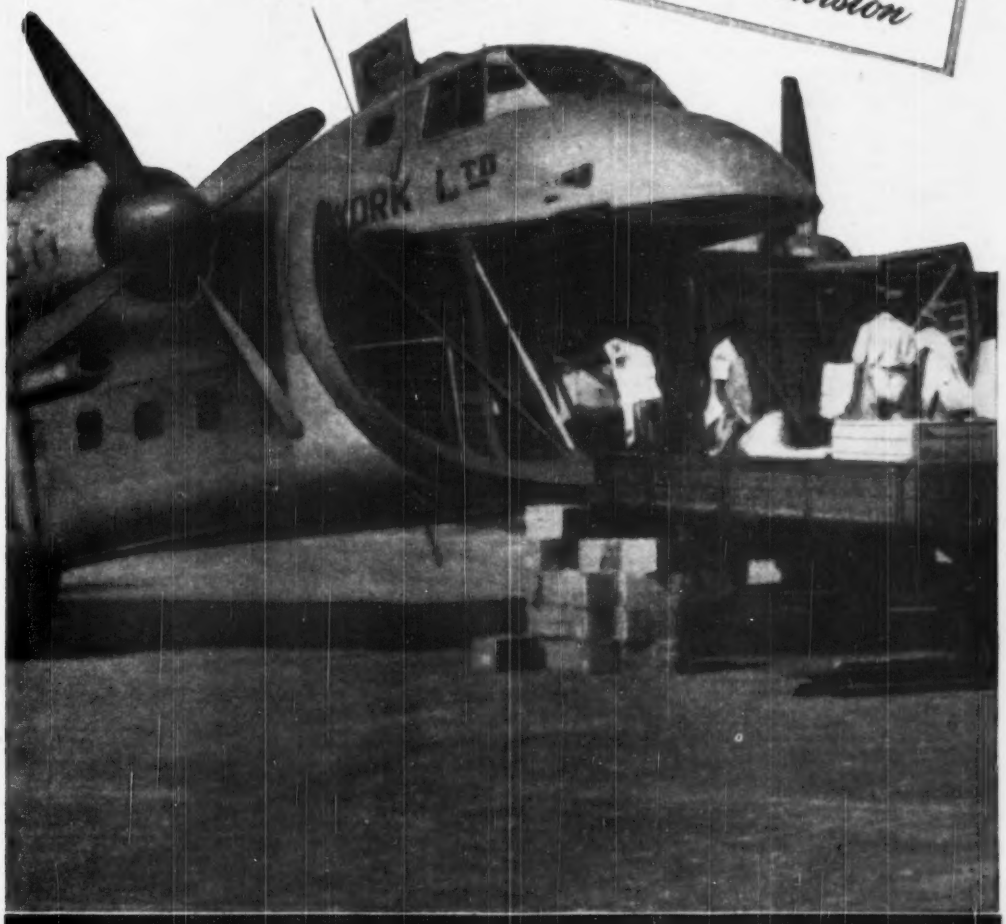

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No.2177.Vol.LVIII.THURS.,14 SEPT.1950

FLIGHT

AND

AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD

FOUNDED 1909

THIS ISSUE OF "FLIGHT"

As most of our readers - in this country, at any rate - will by now be aware, a stoppage of work in a section of the printing industry has seriously affected publication of the majority of periodicals printed in London. Believing that aviation enthusiasts, rather than go without the kind of news they require, would prefer to receive the highlights - in somewhat unconventional guise - we have produced this emergency issue. Though most of the regular features are necessarily condensed, we have succeeded in presenting what we hope will be considered a well-illustrated commentary on that outstanding event, the S.B.A.C. Show. At the time of writing the dispute remains unsettled, but readers may rest assured that we shall continue to do our utmost to keep them in touch.

ANOTHER FARNBOROUGH TRIUMPH

Introducing his presidential address at the annual banquet of the Society of British Aircraft Constructors (at which more than 700 were present, with Air Chief Marshal Sir James Robb, Commander-in-Chief, Air Forces Western Europe, as the principal guest), Mr. W.T. Gill said that people whose interests covered all aspects of aviation affairs were present from nearly every quarter of the globe, and he assured them that everything had been done to see that their journeys were worth while.

On this score there need have been no fears. Having viewed the Society's Farnborough Display, we feel sure that no one can have come away disappointed by what he saw, for once again the aircraft industry provided a brilliant and exhilarating spectacle. No fewer than 30 aircraft - half of the total - were making their first appearance at the Show, and 28 in all were gas-turbine-powered. Indications were to be found everywhere of the virility of the industry and of its growing enterprise - a quality so essential to success but understandably a little stifled in the first year or two after the war.

Almost all the serious gaps have been filled, and manufacturers have now produced promising prototypes of night and all-weather fighters and of modern anti-submarine aircraft. Admittedly there is still an absence of jet bombers in the larger classes, but examples are known to be well advanced in construction, and the outstanding Canberra, already in production, is flying in more than one form.

A good measure of the progress made in turbojet development was provided by a comparison of the performance of the Avon-Meteor this year with that of the same aircraft last year, when the thrust of each unit was a little over 6,000 lb and the climb to 40,000ft took not quite four minutes. Moreover, it cannot have escaped the notice of many spectators that the twin-Sapphire-Meteor, with 14,000 lb thrust available, apparently had nothing over its new-Avon-powered stablemate.

A word must be said for the flight-refuelling of Meteor by Lincoln. Just such a low-level demonstration as this, with its apparent simplicity and precision, was needed to convince of its practicability those who previously had only read of this British development.

It has been suggested that sales results following the S.B.A.C. Air Show do not justify holding it each year. With this view we cannot agree. The staging of a display which has come to be regarded as the world's outstanding annual aeronautical occasion immeasurably enhances Britain's prestige, stimulates both the energies of the industry and the airmindedness of the individual, and provides as well a unique occasion for the exchange of knowledge between the representatives of aviation in all free nations.

GENERAL NEWS

Following the shooting-down, off Korea on September 4th, of a twin-engined aircraft with Soviet star markings and at least one Russian in the crew (his body was recovered), a Washington statement said the incident occurred when it attacked U.S. naval forces. Two days later the Russians protested, alleging that the aircraft, which had neither bomber nor torpedo armaments, was carrying out a training flight from Port Arthur to the area of Hai-Yun-Tao island, 140Km from the shores of Korea, when it was attacked by 11 U.S.A.F. fighters. Investigation, compensation and "punishment of the guilty" were demanded. Both the U.S. Ambassador in Moscow and the State Department in Washington refused to accept the protest, saying it was a matter for the United Nations. Further developments seem likely as we go to press.

The first Meteor 8 jointly produced in Belgium and Holland under the Western Union defence scheme has been test-flown, by Col. Johnny Legrand, before being delivered to the Belgian Air Force. Fokker are building the airframes of these Meteors, and the Derwents are being constructed by the Belgian F.N. company.

The world's largest blimp - ordered by the U.S. Navy for anti-submarine work - is nearing completion at the Akron, Ohio, works of the Goodyear Aircraft Corporation. It will carry a crew of 14 at speeds up to 75 knots. Cost of construction is estimated as £1,780,000.

Apart from R.A.F. "At Home" Day, reference to which is made under the heading "Service Aviation", aviation's big event this week-end is the "Daily Express" South Coast Air Race, from Hurn (Bournemouth) to Herne Bay, on Saturday. There are 76 entries, details of which we gave on August 31st, and estimated approach times for the leading aircraft are: start, 2 p.m.; Portsmouth, 2.50; Brighton, 3; Dungeness, 3.30; Herne Bay Pier, soon after 3.45. After finishing, aircraft will disperse and land at Lympne, Southend, Rochester and other airfields; the prize-giving ceremony, therefore, will be held later, in London - at the R.Ae.C. Aviation Centre, Londonderry House, at 7 p.m. next Wednesday, September 20th. Entrants, competitors and officials may attend, and bring one guest.

CIVIL AVIATION

Lord Pakenham told a trade-union deputation last week that he could hold out no hope of any change of policy in B.O.A.C's decision to suspend its Solent services.

Using two specially equipped DC-3s the Air Survey Company, Ltd. - a Fairey subsidiary - is making an extensive photographic survey of the Carribean area.

An analysis of freight lifted by United Air Lines shows that cut flowers, machinery and wearing apparel are, in volume, the principal items carried. The variety of freight is said to be increasing steadily - "a fact which may well revolutionize existing standards of warehousing and merchandizing".

Hellenic Airlines, in which Scottish Aviation have an interest, have augmented their twice-weekly London-Athens services with a Skymaster flight; the new service leaves Prestwick on Sundays.

Three B.O.A.C. pilots and one engineer have been named as the nucleus of a "Comet flight" which has been established in preparation for the introduction of this aircraft on the Corporation's routes towards the end of 1951.

I.C.A.O. recently published plans for the allocation of H.F. radio frequencies in the North Atlantic and Pacific regions. A similar plan for the European/Mediterranean area was discussed at the Paris Conference in June. The date on which new frequencies will be introduced is to be decided at the International Telecommunications Union Conference convening at the Hague on September 23rd.

Technical trials are now being conducted with V.H.F. omni-directional range equipment which has been installed at London Airport.

The Allied High Commission has re-affirmed the ban on flying by Germans. New regulations state that although German nationals may service aircraft, operate ground-communication systems and assist in the construction of airports, they will not be employed as aircrew members or be allowed to manufacture, possess or operate aircraft or engines

Meteorological Report No. 7, published by the Meteorological Office and entitled "Equivalent Headwinds on Some of the Principal Air Routes of the World" should be of great value to commercial operators and pilots planning flights overseas. It details average equivalent headwind values for each route throughout the four seasons at 10,000ft intervals up to 40,000ft.

With a non-stop flight of 942km (585 miles) from Brussels to Biarritz a Mikron-engined Tipsy Belfair has established a new world record for aircraft with an a.u.w. not exceeding 500kg.

The Chrislea C.H.3 (Series 4) Skyjeep has completed its A.R.B. acceptance trials and the makers state that it is about to receive its C. of A. Fin and rudder area have been increased, and the undercarriage shortened and widened in track. The modified tail unit is also being applied to the Super Ace, and will be available at cost to present operators. A Super Ace, incidentally, has been placed at the disposal of the R.A.F. team taking part in the International Air Pentathalon in Switzerland.

SERVICE AVIATION

Two hundred and sixteen aircraft will take part in the Battle of Britain fly-past over London this Friday, September 15th. As in previous years, they will be led by a single Hurricane; it will be followed by three Lancasters and six Lincolns, and then will come 36 Mosquitoes, 8 Firebrands, 12 Hornets, 8 Sea Hornets, 54 and 24 Meteors, 48 Vampires and 16 U.S.A.F. F-84 Thunderjets. Flying up the line of the Thames, the first aircraft is due over Westminster at 12.30 p.m. The formations will then scatter and tour various areas of the South and Midlands.

On Saturday, R.A.F. "At Home" Day, 70-odd stations will be open to the public; admission will be free, and proceeds from car parking and programme sales will go to Service charities. A full list of the stations was given on p. 256 of "Flight" for August 31st, though three, Cranwell, Wyton and Topcliffe, have since been withdrawn. R.A.F. marine craft will be moored on the Thames, off the Tower of London, until September 17th.

First squadron to win the Duncan Trophy for all-weather flying is No. 74, equipped with Meteor 4s and based at Horsham St. Faith. The Trophy, presented by General Gervasio Duncan, Chief of Staff of the Brazilian Air Force, to commemorate his visit to the R.A.F. in 1947, is awarded to the unit which, as shown by special statistics kept for the purpose, puts up the best all-weather flying record over a year. No. 74's 276 hours of bad-weather work included 63 approaches in conditions of under 500ft cloud-base and one-mile visibility, a formation climb by four aircraft through 27,000ft of cloud and a large number of controlled let-downs under I.F.R. rules. No. 26 Squadron, R.A.F.O., with Vampires, were runners-up. Presenting the Trophy, Air Marshal Sir Basil Embry said he had originally recommended that it be presented for the best squadron record in instrument flying because at that time he thought that the standard in fighter squadrons was not sufficiently high to meet future requirements in war. He was not, however, one of those who thought that single-seaters should fly in all weather conditions.

As briefly recorded last week, ten Vampires of the Royal Swedish Air Force recently landed at North Weald on a goodwill visit to the R.A.F. They were met over the North Sea by Vampires of No. 72 Squadron (led by S/L. D.E. Kingaby) and escorted to the airfield, where their C.O., Col. Ahmasson, was welcomed, with his pilots, by A.V-M. T.G. Pike (A.O.C. No. 11 Group) and the Swedish Ambassador. During their week's stay the Swedish pilots visited R.A.F. stations Waterbeach and Lincoln-on-Ouse, the H.Q.s of No. 11 Group and Fighter Command, the de Havilland works at Hatfield and the S.B.A.C. Display; they also attended an Air Council reception.

It is now possible to give further brief examples of the new R.A.F. rates of pay (effective from September 1st) to which reference was made last week. Taking the annual sums, exclusive of allowances, a pilot officer now receives £319, with £128 flying pay; a flying officer £356 plus £146; flight lieutenant £529 and £164; squadron leader £767 and £164; wing commander £1,013 and £91; and group captain £1,352 and £91. These are "basic" figures, and for the lower ranks increase substantially for the later years of service. W.R.A.F. officers' basic pay now ranges from £242 for a pilot officer to £1,163 for an air commandant. Some examples of weekly rates of pay for R.A.F. other ranks are: A.C.2, 77s; corporal, 98s; sergeant, 126s; flight sergeant, 150s 6d; warrant officer, 171s 6d; all these are Group A rates. W.R.A.F. other ranks' weekly pay in Group A ranges from 57s 9d for an A.C.W.2 to 113s 2d for a flight sergeant. R.A.F. aircrew rates are too numerous to give here in any detail, but weekly-rate examples chosen at random are, including flying pay: sergeant pilots and navigators, 157s 6d; flight sergeant ditto, 192s 6d; sergeant signaller, engineer or gunner, 140s; flight sergeant ditto, 164s 6d. Again, these are basic rates.

AIRCRAFT AT THE SHOW

Notes on New Developments : Brilliant Demonstration-flying

In the following pages is a first-hand description of the Farnborough flying demonstrations and notes on aircraft in the static park, written by members of the staff and illustrated mainly with "Flight" photographs and drawings. In general, the demonstrations described were those given on the first two days, but in nearly all instances the pilots' repertoires were repeated exactly throughout the duration of the Show. For the reason that the 40-odd aircraft flown were handled by between 50 and 60 pilots during the five days, it has not been possible to give their names in all cases. Without exception, the piloting was brilliant, and all those concerned deserve the greatest credit for their performance of an always exacting duty.

MILITARY AIRCRAFT

Armstrong Whitworth Meteor N.F.11. In the air, this two-seater, radar-equipped night fighter showed speed and manoeuvrability of a very high order. These qualities can be attributed to the essentially sound Meteor airframe as designed and developed by the Gloster Company, and to the manner in which the Armstrong Whitworth technical team have achieved the necessary alterations without detracting from the aerodynamic characteristics. It is not unreasonable to suppose, in fact, that speed has actually benefited. The increased wing area, resulting from the extended span (48ft 6in), confers an added advantage in certain manoeuvres, and if rate of roll is seriously affected this was certainly not apparent at Farnborough.

Avro Athena T.2. The ample power-reserve afforded by the 1,280-h.p. Rolls-Royce Merlin 35 engine and the inherent handling qualities of this advanced trainer contributed equally to Mr. Nelson's engaging displays.

Avro Shackleton G.R.1. With its 120-ft wing span and abundant urge from the four contrapropped Rolls-Royce Griffon engines, this far-ranging submarine hunter (pilot, J.D. Baker) took off smartly and climbed vigorously before its impressive low runs.

Blackburn and General Aircraft Y.B.1. Credit for altogether admirable flying demonstrations must be shared by Mr. Peter Lawrence and this amazingly handy carrier-borne anti-submarine aircraft. From the short, fast unstick run and steep initial climb to the slow, short, landing, the performance was a liberal education. The outstandingly high rate of roll won enthusiastic approval from pilots and technicians alike. Its formidable capacity notwithstanding, the three-seater Y.B.1 appears much superior in general performance to specialized naval single-seat fighters of a few years ago. Regrettably, technical information is still severely restricted, but it can be said that the role of the Y.B.1 (and, for that matter, its piston-engined precursor, the Y.A.5) can be varied from solely search and tracking at one extreme to solely attack at the other, with various combinations of roles in between.

Blackburn and General Aircraft G.A.L.60. All praise to W/C. "Timber" Wood and to this ultra-capacious freighter for proving - insofar as the demonstration allowed - that Britain now possesses an easily loaded military transport capable of operating from small airfields. Like the elephant (with which it has much in common), the G.A.L.60 seems useful and docile. Especially satisfactory is the knowledge that it should prove equally efficient in military and commercial operation.

Boulton Paul Balliol T.2. Having regard to S/L. "Ben" Gunn's getaway in the Balliol, the makers' claim of a take-off run to 50ft of 450 yd can readily be believed. The performance specification of this advanced trainer, now in quantity production for the R.A.F., further shows a climb to 10,000ft in 6 min. The Balliol's reputation for manoeuvrability, of course, is already a byword among pilots, and its Farnborough demonstrations brought out all its best points in this respect.

de Havilland Vampire Trainer (D.H.115). The object behind the design of this "all-purpose" trainer is that of providing the widest variation of training duties while retaining the essential simplicity and good characteristics of the Vampire. Instructor and pupil are seated side by side on adjustable 25/40g seats with ample room at shoulder level: the width at this level is, in fact, 44in - one inch more than in the Airspeed Oxford. The prescribed duties are jet conversion and operational training in gun-, rocket- and bomb-sighting and fighter navigation, and each occupant has complete dual control and an individual blind-flying panel, with the engine instruments placed centrally. The upper section of the central panel also carries a Machmeter and the flying-instrument panels have provision for two I.L.S. indicators, in addition to a Sperry G.IVB Gyrosyn compass dial. Normal radio equipment is two five-channel V.H.F. sets. The cockpit is pressurized to a differential of about 3 lb/sq in. Standard Vampire 5 fighter/bomber armament is specified and wing tanks may be carried. At a Mach number of 0.7 at 40,000ft the radius of steady turn is quoted as 1.95 nautical miles. Without external equipment the limiting Mach number at high altitude is slightly under 0.8.

de Havilland Vampire F.B.5. A standard fighter/bomber of this type was parked with representative war loads appropriately disposed.

de Havilland Vampire Night Fighter. This dark-visaged two-seater, which first flew some twelve months ago, has new - almost pointed - vertical tail surfaces (as on the Vampire Trainer) and, noticeable among a heterogenous collection of types in the static park, had an appearance of almost sinister efficiency.

de Havilland Venom N.F.2. An all-round performance much superior to that of the Vampire has already been demonstrated by this new and logical Venom night-fighter development, although it has flown only a few hours. In his initial presentation John Derry proved that not only is this welcome newcomer very fast indeed (possibly faster than any previous D.H. fighter), but that the climb is what might be expected of a combination of a moderate wing loading and a Ghost turbojet.

de Havilland Chipmunk T.10. Both intimate and sparkling was the aerobatic offering of this ever-fascinating elementary trainer, supplied not only to the R.A.F.V.R., but to Denmark, Thailand, Egypt, South Africa, Australia and India.

English Electric Canberra B.2. This mark of Canberra carries a crew of three in its pressurized cabin, and differs externally from the Mk.1 in having a transparent plastic nose and a window on the port side. Performance, however, does not appear to be inferior to that of the astonishing B.1 prototype; in fact, W/C. Beamont's performance was, if possible, more stylish and convincing than ever. Certainly there was general agreement that his low runs were faster.

Fairey 17. On Wednesday the "17" was put through its paces entirely on one unit of the Double Mamba turboprop; but whether on half or full power,

AIRCRAFT AT THE SHOW...

this formidable submarine killer is eminently tractable and lively. Aileron control at all speeds seems especially good. It was made known that not only are attack weapons stowed inside the roomy bomb-bay, but that provision is made for carrying sonobuoys and other war equipment under the wings. In the flying display on the first day the pilot made full use of the reverse torque mechanism in the Double Mamba; this is, in effect, an automatic feathering device enabling him to switch from one half of the engine to the other in a matter of seconds. Messrs. Slade and Twiss were the demonstration pilots. A model showed a new "17" variant, with rear cockpit enclosure (for two) well aft, and a redesigned nose.

Fairey Firefly. Stacked before a Firefly were such warlike stores as R.P.s, bombs, depth-charges, sonobuoys and guns, which, of course, this carrier-borne two-seater handles impartially.

Fairey Firefly T.T.1. A target-tug of this type, owned by Svensk Flygtjanst A.B. of Stockholm, was displayed, together with a 30-ft winged target.

Gloster Meteor 8. Among the most remarkable - certainly the most novel - flying displays were those by "Mike" Kilburn on a Meteor 8 carrying two 1,000-lb bombs and a belly tank. Not only was the standard of piloting skill extremely high and every manoeuvre placed to a nicety, but the Meteor did not appear in the least handicapped by its weighty excrescences. Half an outside loop suggested that Kilburn was flying almost to the structural limits of the Meteor, but even more spectacular (because it was performed at close quarters) was his sustained inverted turn into the circuit, during which he extended his undercarriage prior to righting the aircraft and landing. The spectacle of this slender fighter flying on its back, with three wheels, two bombs and a large tank between it and the sky, can be imagined.

Gloster P.V. Meteor. Developed specifically for intensified ground attack, this latest Meteor was the show-piece of the static park. The "extras", upon which interest centred (for the airframe is basically a Mk.8), were painted cream, to contrast with the red aircraft, and a highly edifying study they made. Rather than catalogue them exactly as displayed, however, their significance may be explained. Briefly, this P.V. Meteor will carry four 1,000-lb bombs, under wings and fuselage; or twenty-four 95-lb R.P.s (wings and fuselage); or five external tanks (wing-tips, under-wing, and ventral) of 580 gallons total capacity; or, in place of the ventral tank, two extra guns, making a total of six. Though, as shown, the additional guns were of 20-mm calibre, one had no doubt that the fairing (or belly-tank dimensions) would accommodate a brace of "30s" if necessary. Various mixed loads are possible. At the higher loadings RATOG is required (two bottles under the fuselage and two on the fuselage sides), and an arrester hook, for land use, mounted well forward beneath the fuselage, is intended.

Handley Page (Reading) H.P.R.2. This highly promising basic trainer can be fitted with almost any piston engine in the 400-600 h.p. range, the normal power unit being the Armstrong Siddeley Cheetah 18 or Alvis Leonides 502/4. With the Cheetah the top speed at 2,500ft is 150 kt; endurance at maximum weak-mixture power (normal fuel), 2.84 hr; climb to 5,000ft, 5 min; and take-off distance to 50ft, 450 yd. Corresponding figures for the version with the Leonides are: 165 kt, 2.62 hr, 3.8 min, 350 yd. The span is 37ft; wing area, 223 sq ft; and all-up weight, 4,400 lb. In the flying display the type gave a zestful performance in the hands of Hugh Kendall, the flick rolls being especially appreciated.

Hawker P.1081. It was made known that the Rolls-Royce Nene 4 installed in this "all swept" fighter can be provided with reheat to 1,500 deg absolute. Notwithstanding the unusually short span of 31ft, the wing area is 258 sq ft; thickness/chord ratio is 10 per cent constant and the sweepback at the quarter chord line, 35 deg. As always, Trevor Wade's aerial demonstration was faultless, especially in revealing the extremely high rate of roll.

Hawker Sea Hawk F.1. There is little doubt that Neville Duke exceeded the Sea Hawk's fastest S.B.A.C. Challenge Cup speed of 584 m.p.h. in his initial run at Farnborough; in fact, one judged that this clean-lined, Nene-powered Naval fighter had never been flown faster in a public display. Its passage was relatively silent, and the cockpit is said to be unusually quiet throughout the speed range, which contributes much to the reduction of fatigue. Duke's demonstration was sheer perfection, and he had the happy notion of lowering the arrester hook on the approach and retracting it immediately before touch-down.

Hawker Sea Fury F.B.11. A standard Sea Fury was displayed with representative external stores and under-fuselage RATOG. The makers point out that with over a ton of effective armament this type can operate some 330 miles from base or, with six R.P.s and cannon, can attack ground forces nearly 600 miles distant.

Percival P.56. For the first time, performance and other data were released for this basic trainer, which is powered by a 420 h.p. Armstrong Siddeley Cheetah 18 engine, though an Alvis Leonides is to be installed in the third prototype. Salient characteristics are: max. speed at 2,500ft, 178 m.p.h.; continuous cruising speed at the same height, 155 m.p.h.; climb to 10,000ft, 10.7 min; take-off distance to 50ft, 421 yd; service ceiling, 17,600ft. The gross weight is 4,050 lb. Flying demonstrations by Mr. Wheldon showed this very compact-looking trainer to be extremely lively.

Percival Sea Prince. A Sea Prince, with Naval markings, and fitted out for communications flying, looked very ship-shape in the static park.

Saunders-Roe Flying-Boat Fighter. A design study has been made of an S.R./A.1 development with swept and tail surfaces, faired step and lateral stabilising floats, which retract on to the wing tips Duchess-fashion. Could two Sapphires be intended?

Short S.B.5. Many a quip directed at the pendulous fore-end of this businesslike Sturgeon anti-submarine development died half-uttered as the machine scurried off the runway for a zestful demonstration. Stopping the port Mamba appeared to affect performance relatively little. Messrs. Brooke-Smith and Crossley were the demonstrators. The S.B.5 seems to possess in generous measure the most desirable attributes of a carrier-borne aircraft.

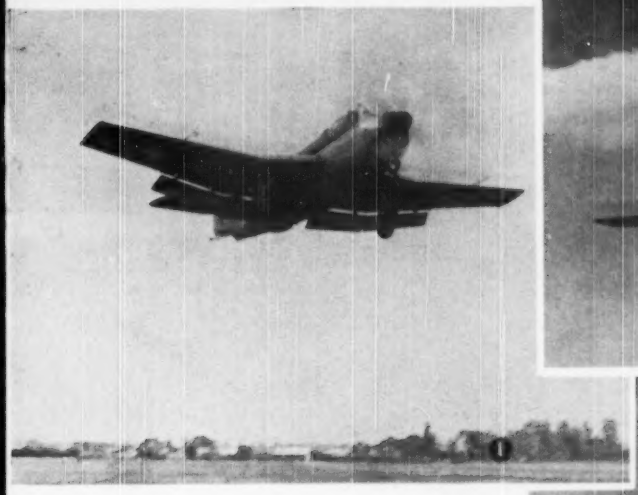
Vickers-Armstrongs Valetta T.3 Classroom. Misplacarded as Valetta C.3 (makers please note), this near-relation of the Valetta transport sported six astrodomes, which evoked some rustic humour. More will be heard of this latest Valetta development.

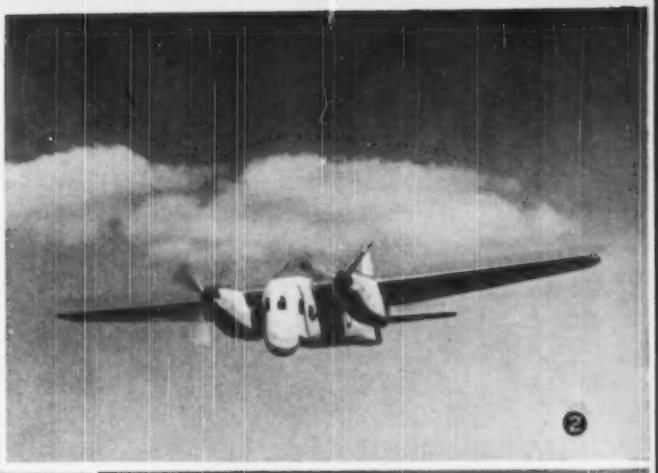
Vickers-Armstrongs Varsity T.1. With its twin Bristol Hercules 264 engines this excellently planned crew trainer again showed that it is quite fast and handy, notwithstanding its size (span 94ft11in) George Lovdell was at the wheel.

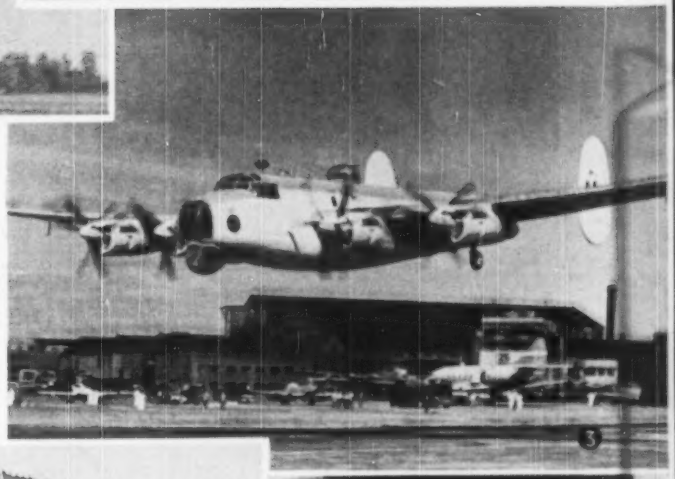
Vickers-Supermarine Attacker F.1. An Attacker Naval fighter (Rolls-Royce Nene), from Vickers-Supermarine's South Marston production line, was shown with folded wing-tips, 250-gal belly tank, and RATOG, though the latter was not actually affixed.

Vickers-Supermarine 535. Although this new Nene-powered development of the 510 flew for the first

(continued on page 299)



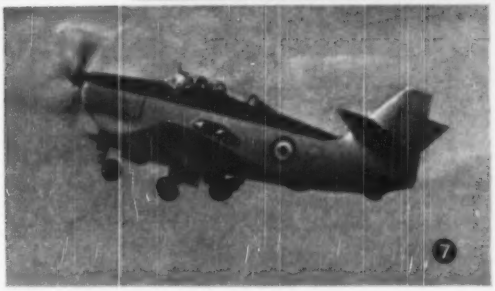


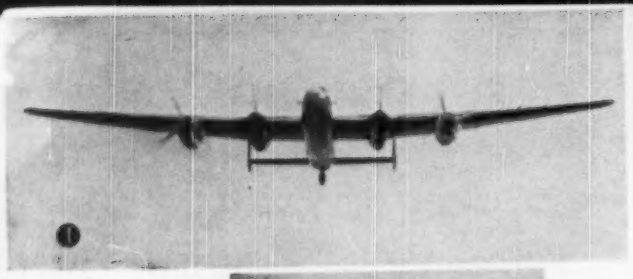


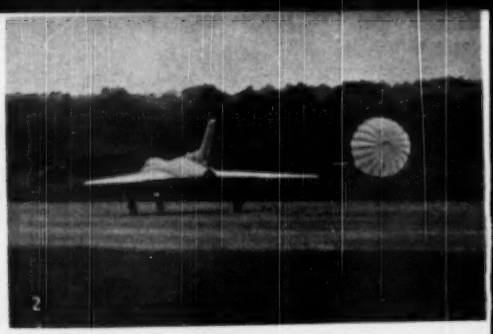
AIRCRAFT AT THE SHOW

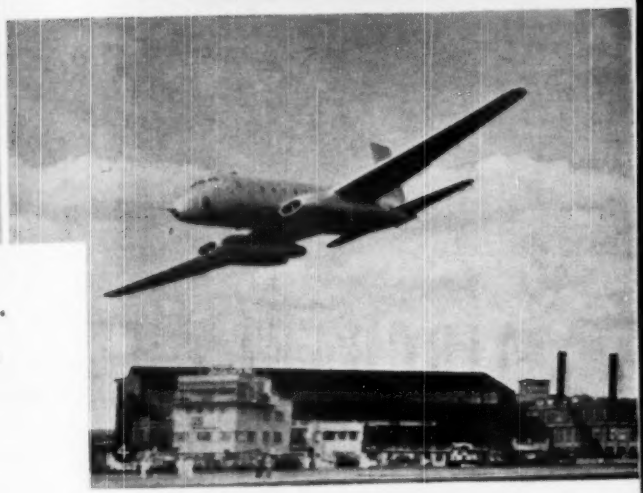
Illustrated mainly with "Flight" Photographs

1. Fairey 17 (Armstrong Siddeley Double Mamba).
2. Short S.B.3 (2 Armstrong Siddeley Mambas).
3. Avro Shackleton (4 Rolls-Royce Griffons).
4. (l. to r.) M. Moch, Lord Pakenham, M. Pineau and Mr. Arthur Henderson.
5. Mr. W. T. Gill and Sir Roy Dobson.
6 and 7. Blackburn Y.B.1 (Armstrong Siddeley Double Mamba).



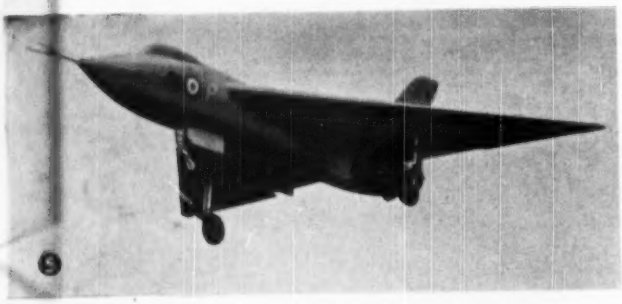


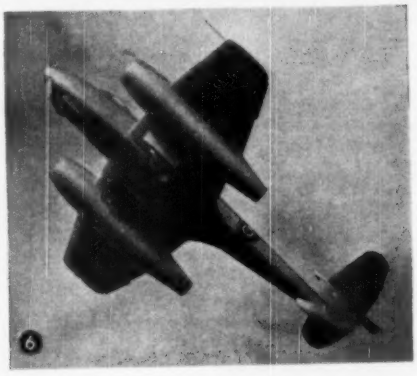


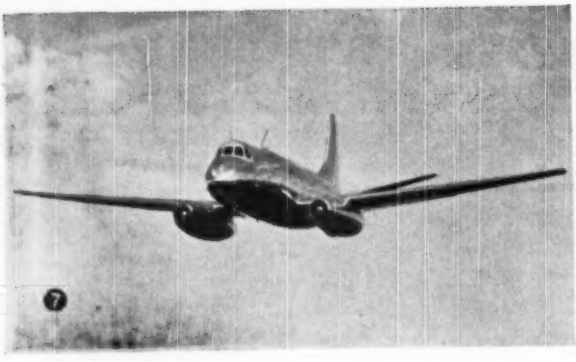


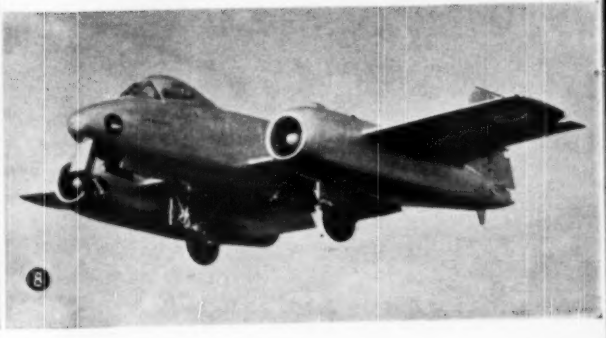
AIRCRAFT AT THE SHOW . . . . .

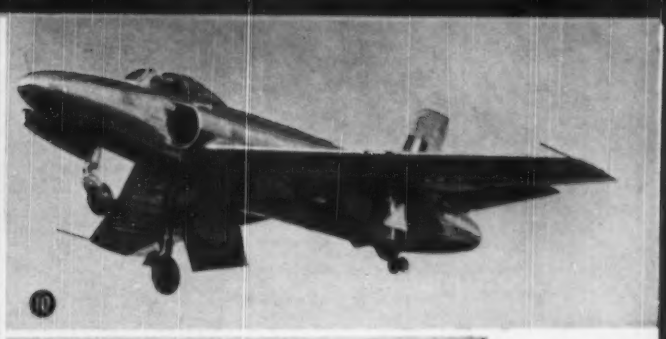
1. Avro Proteus-Lincoln (2 R.-R. Merlins and 2 Bristol Proteus).
2. Avro 707B with braking parachute.
3. Sapphire - Meteor inverted.
4. Avro Ashton (4 Rolls-Royce Nenes).
5. Avro 707B (Rolls-Royce Derwent).
6. Avon - Meteor.
7. Tay-Viscount.
8. Sapphire-Meteor.

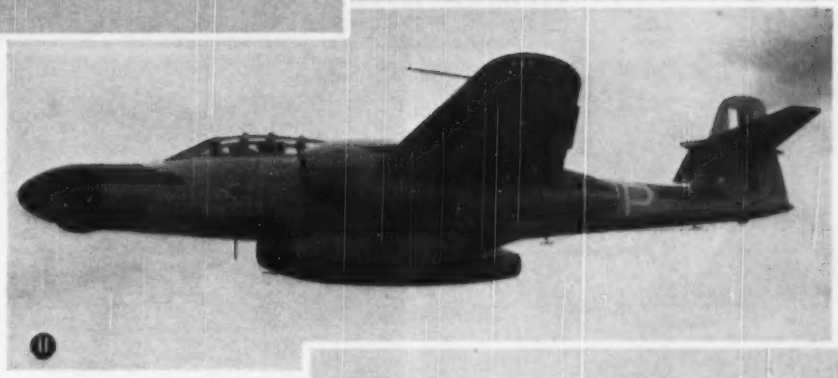










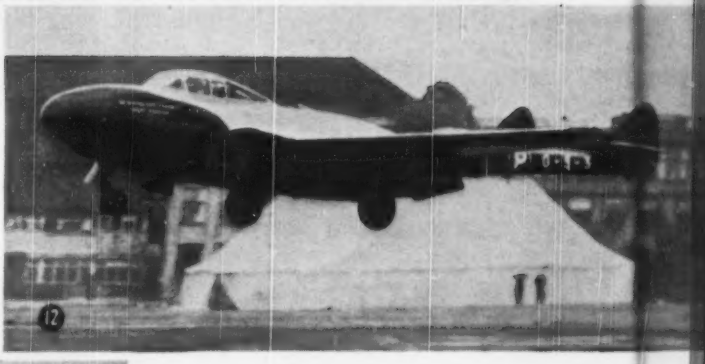


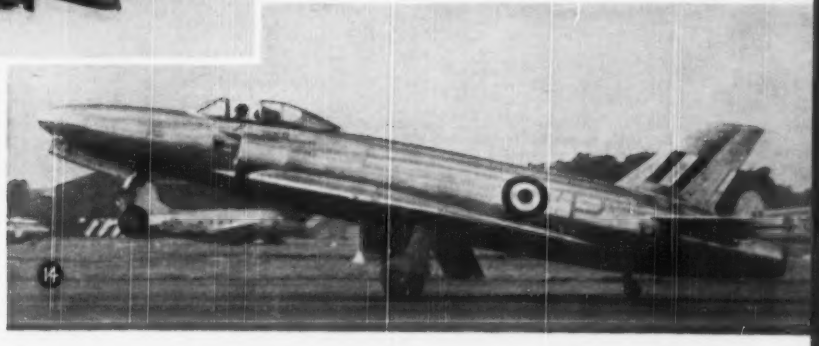
9 and 12. de Havilland Venom Night Fighter (D.H. Ghost).

10 and 14. Vickers-Supermarine 535 (Rolls-Royce Nene with afterburner).

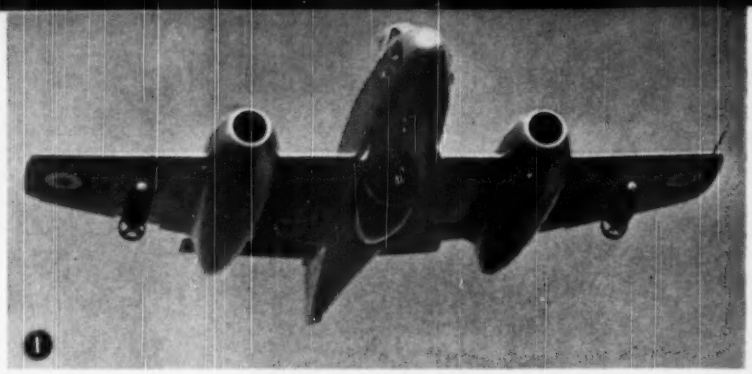
11. Armstrong Whitworth Meteor N.F.11 (2 Rolls-Royce Derwents).

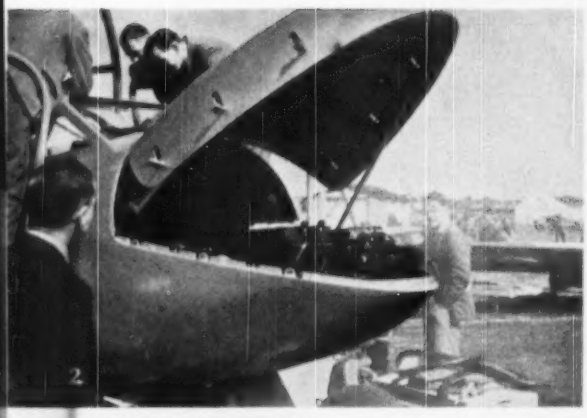
13. Westland Wyvern T.F.2 (Armstrong Siddeley Python).

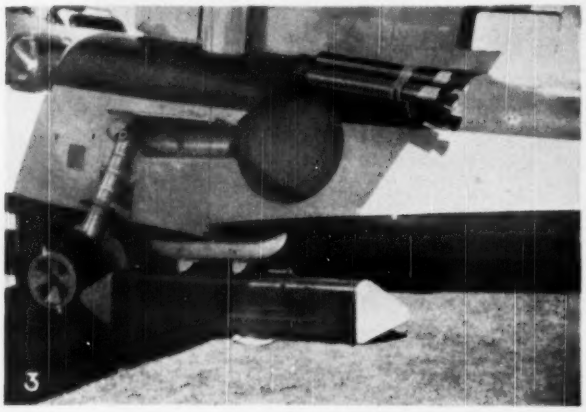


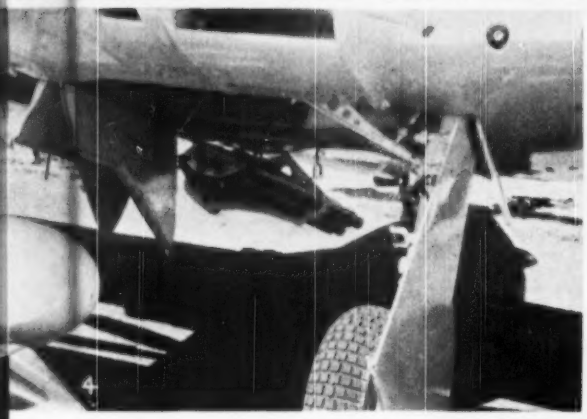


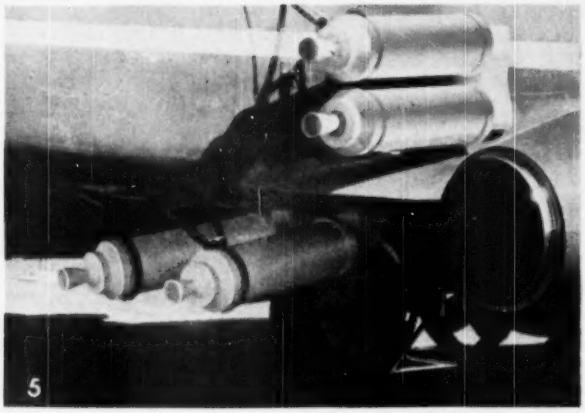
AIRCRAFT AT THE SHOW ...



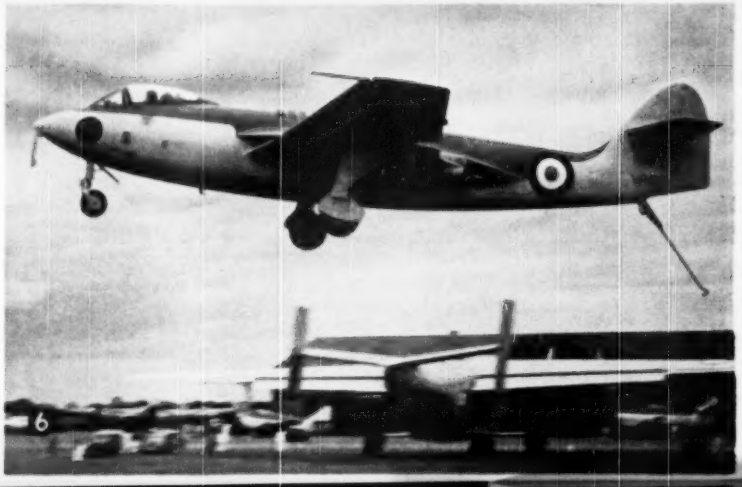


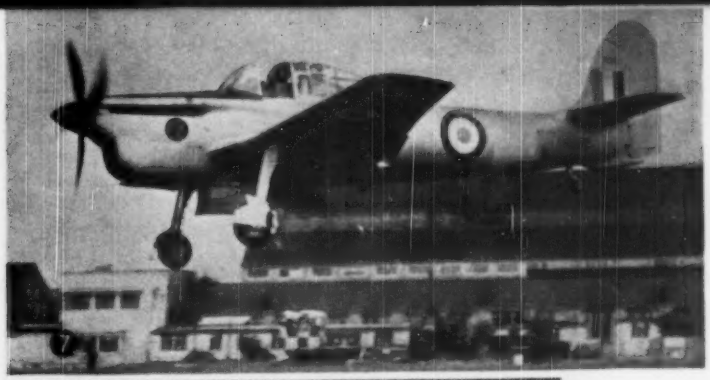




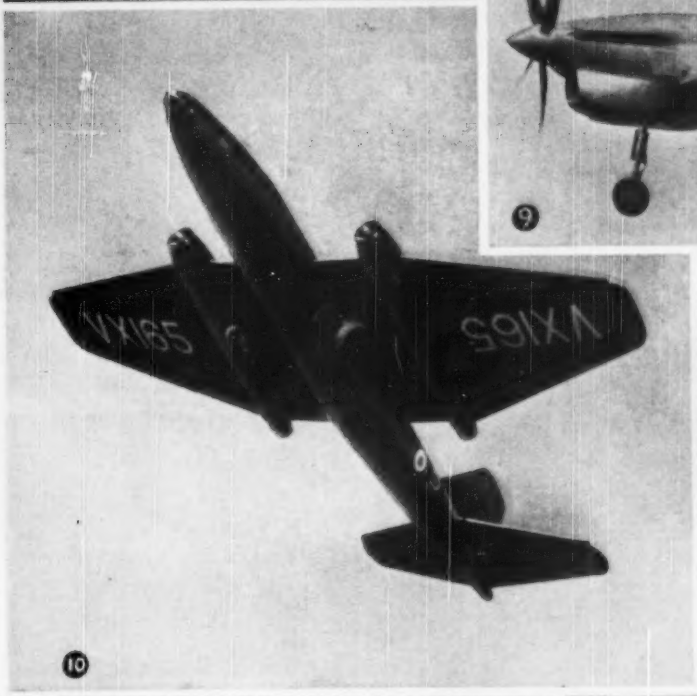


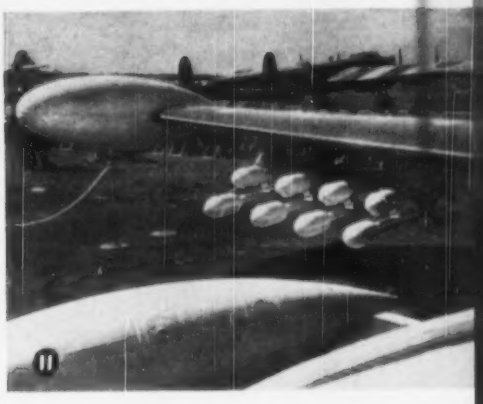
1. Gloster Meteor 8 (2 x 1,000 lb bombs and ventral tank).
2. D.H. Vampire Trainer with hinged nose decking.
3. RATOG on Vickers-Supermarine Seagull.
4. RATOG on Hawker Sea Fury.
5. RATOG on Gloster P.V. Meteor.
6. Hawker Sea Hawk (Rolls-Royce Nene).

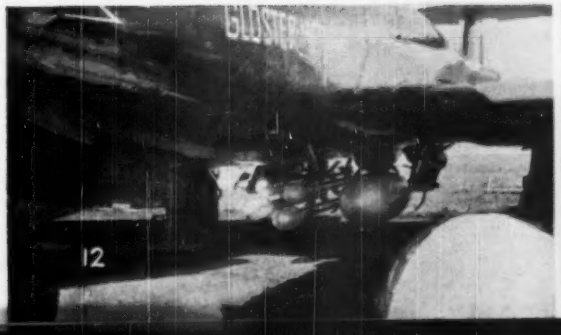


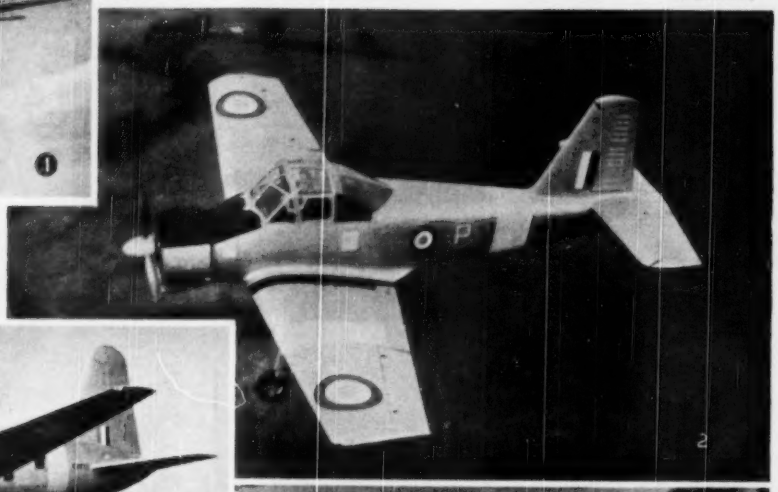


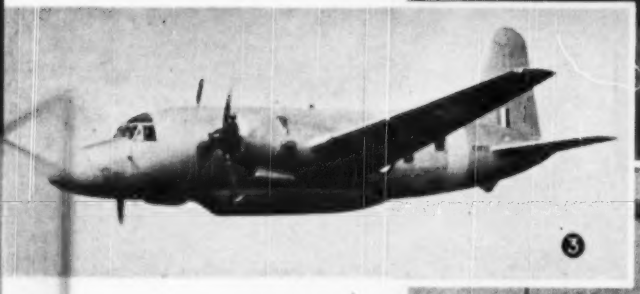
7. Avro Athena (Rolls-Royce Merlin).
8. Vickers Valetta Classroom (2 Bristol Hercules).
9. Boulton Paul Balliol (Rolls-Royce Merlin).
10. English Electric Canberra (2 Rolls-Royce Avons).
11. Tip-tank and under-wing R.P.s on Gloster P.V. Meteor.
12. Under-fuselage R.P.s and bomb on Gloster P.V. Meteor.
13. Tip-tank and 1,000 lb bomb on Gloster P.V. Meteor.

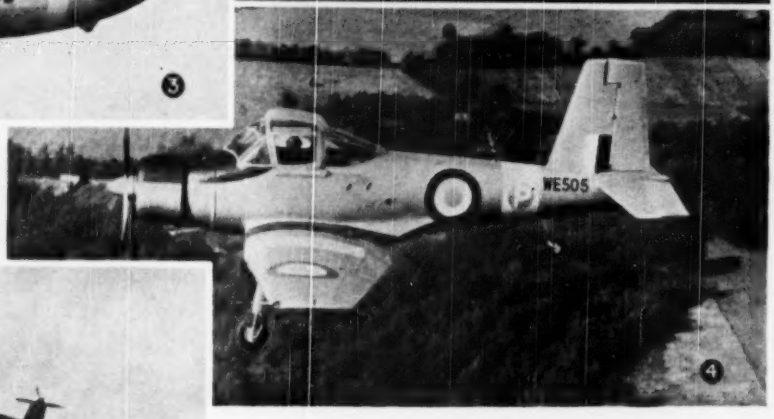


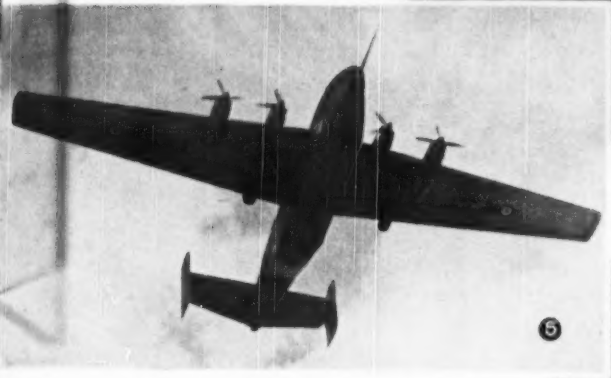


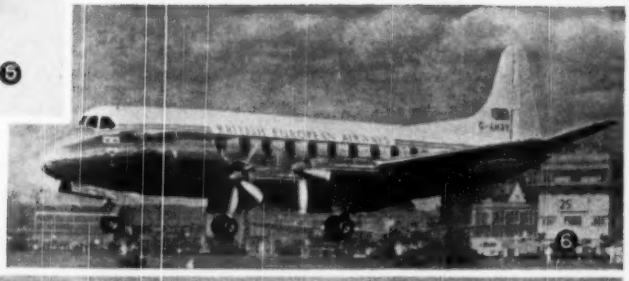






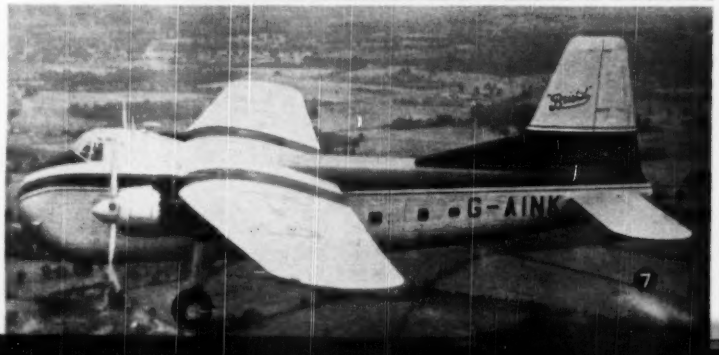






AIRCRAFT AT THE SHOW . . .

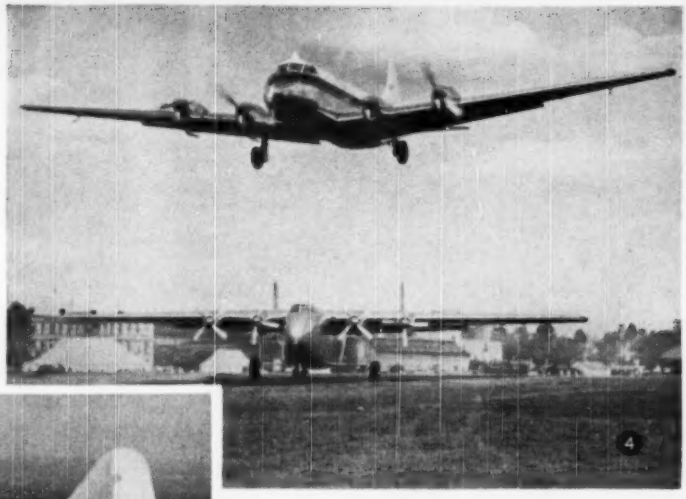
1. Handley Page Hermes V (4 Bristol Theseus).
2. Percival P.56 (Armstrong Siddeley Cheetah).
3. Vickers Varsity (2 Bristol Hercules).
4. Handley Page (Reading) H.P.R.2 (Armstrong Siddeley Cheetah).
5. Blackburn and General Aircraft G.A.L. 60 (4 Bristol Hercules).
6. Vickers Viscount 700 (4 Rolls-Royce Darts).
7. Bristol 170 Mk. 31 (2 Bristol Hercules).

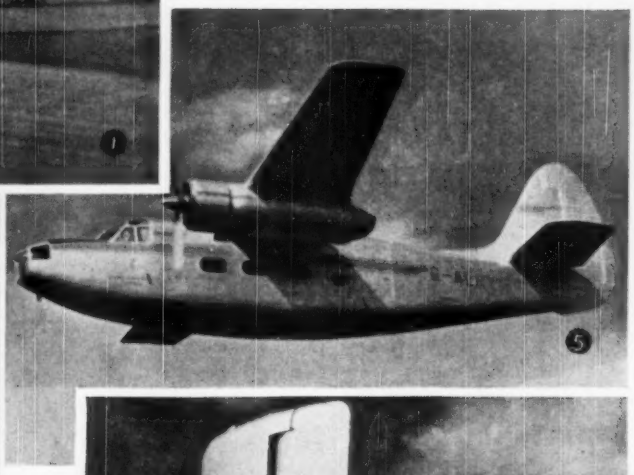


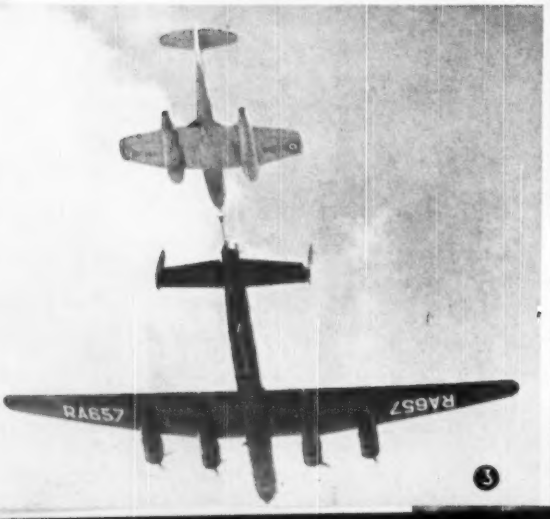
8. Armstrong Whitworth Apollo (4 Armstrong Siddeley Mambas).
9. Airspeed Ambassador (2 Bristol Centauras).
10. Short Sealand (2 D.H. Gipsy Queens).
11. de Havilland Comet (4 D.H. Ghosts).
12. de Havilland Chipmunk (D.H. Gipsy Major).
13. Bristol 171 Mk.3 (Alvis Leonides).
14. Bristol Brabazon I (8 Bristol Centaurus in pairs).

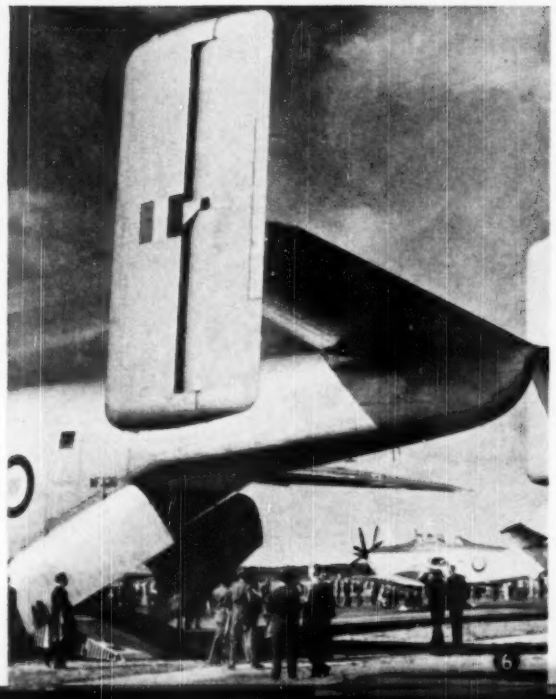
AIRCRAFT AT THE SHOW . .

1. Fairey Firefly target-tug (Rolls-Royce Griffon).
2. Cabin of the Bristol 171 Mk. 3.
3. Flight Refuelling of Gloster Meteor by Avro Lincoln.
4. de Havilland Heron (4 D.H. Gipsy Queens) over Blackburn and General Aircraft G.A.L.60.
5. Percival Survey Prince (2 Alvis Leonides).
6. Rear loading ramp of Blackburn and General Aircraft G.A.L.60.









AIRCRAFT AT THE SHOW . . .

time as recently as August 23rd, "Mike" Lithgow handled it in the same uncompromising manner as its predecessor. The most obvious innovation is the nosewheel undercarriage, but, having regard to the marked tail-down attitude assumed at take-off and landing, the retractable twin tailwheel has been retained. To accommodate the main undercarriage the wing plan-form has been revised. The nose of the fuselage has been extended (the overall length is now 42ft 11in - over 11ft greater than the wing span), and the rear fuselage has been distended to receive an afterburner. Intake form has also been the subject of revision. At present the armament of four 20-mm guns is disposed in the wings, Attacker style, but the production aircraft will have fuselage-mounted armament. At 295 sq ft the wing area is 22 sq ft greater than that of the 510.

Vickers-Supermarine Seagull. This record-breaking amphibian was exhibited with two under-wing air/sea rescue packs, derrick, drogue and RATOG units fitted above the wheel wells.

Westland Wyvern T.F.2. Carrying a "tinfish" in addition to 16 rocket projectiles, this Python-powered strike fighter achieved rolls and other manoeuvres with the grace and ease of a much lighter and smaller machine; as the makers point out, although the span of 44ft is little more than that of the Hurricane, the Wyvern is much heavier and more massive. Detailed information is still withheld, but it may be remarked that the track of the Dowty tailwheel undercarriage is 14ft 5in and the wheelbase 23ft 8in. In addition to the Youngman three-position flaps there are split flaps (used for landing) between the Youngman flaps and the ailerons, outboard of the wing hinge. The dorsal fin has now been eliminated. Demonstrators were Messrs. Penrose and Colvin.

RESEARCH AIRCRAFT

Avro 707B. On Wednesday afternoon the word went round that the Avro 707B delta-wing research aircraft had just made its first hops at Boscombe Down - one lasting for 15 seconds. Delivery to Farnborough was quickly authorized, and when the scheduled flying display had concluded the beautiful blue projectile was spotted far distant, under the threatening clouds. At this time the Brabazon was being re-positioned and, after a run across the airfield at a few hundred feet, W/C. Falk was obliged to orbit until the mammoth had been coaxed into its resting place for the night. The patience of all onlookers was ebbing fast (not due to any shortcomings on the part of the Brabazon's handling crew, but for consideration for the 707's fuel supply) when the runway was cleared at last and the delta skimmed in low and fast in the stiff cross-wind for a perfect touch-down. Instantly two objects fell away and there was a moment of alarm until - quite unexpectedly - a tail parachute blossomed and the dainty little machine ran itself to a standstill. As it taxied in it could be seen that not only is the nose appreciably longer than on the former 707, but that the tail unit has been re-designed. As formerly, the power unit is a Rolls-Royce Derwent.

Avro Ashton. A top speed of over 400 m.p.h. is announced for this brand-new, high-altitude research aircraft, first of six to be built for the M. of S. Mr. Orrell presented the Ashton in attitudes which disclosed its somewhat "Jetliner-esque" lines. Four paired Rolls-Royce Nenes are installed, and at 40,000ft the cabin altitude is 8,000ft.

Avro Proteus-Lincoln. Mr. Walter Gibb flew this engine-development aircraft with verve, unaided by the inboard Merlins.

Flight Refuelling. Mr. Pat Hornidge, who gave a sequence-to-sequence commentary from the Meteor, and Capt. Marks, in charge of the Lincoln tanker, provided a Flight Refuelling demonstration of exceptional interest and real technical value.

Gloster Avon-Meteor. Mr. Heyworth's presentation of this super-powered Hucknall test-bed was nothing short of sensational. From slow, level flight the Meteor reared up on its tail and absented itself at an angle as near the vertical as made no difference. The nose, incidentally, must always be pulled up sharply immediately the wheels are off the runway on a full-power take-off; otherwise the "wheels up" speed is exceeded.

Gloster Sapphire-Meteor. Zurakowski's demonstration of this Sapphire development aircraft differed essentially from Heyworth's in that he did not, so to speak, sit the machine on its jets at such low speeds; but his performance certainly justified the publicity which marked the Meteor-Sapphire union shortly before the Display.

Vickers-Armstrongs Tay-Viscount. As might be supposed, some 12,500 lb of Tay-thrust applied to a clean Viscount airframe is productive of high speed and quite uncommercial rates of climb. Mr. Bryce left no doubts on this score.

CIVIL AIRCRAFT

Airspeed Ambassador. Mr. Errington flew a production Ambassador in the "heavy circus", a brief presentation of eight aircraft which opened the flying programme. This year, the Ambassador's performance was limited to a graceful fly-past with both Centaurus power plants turning quietly, but one recalled the outstanding single-engined capabilities previously demonstrated. White, red and silver B.E.A. finish enhanced the appearance of this slim 49-passenger airliner, due to enter service next year.

Armstrong Whitworth Apollo. Since its first public flight at Farnborough last year the prototype Apollo has acquired an extended dorsal fin, and now looks particularly smart in a silver, cream and green colour-scheme. Mr. Franklin again demonstrated a commendably short take-off and, flying past, lively performance with only two Mambas in action. The Apollo is offered as a 24-40-passenger airliner, a civil or military freighter, or an ambulance. Maximum weight is 45,000 lb and the still-air range is 1,200 miles. Normal cruising speed is quoted as 240kt.

Auster Aiglet. Newest in the Auster lightweight range, the Aiglet was outstandingly demonstrated by Mr. Ranald Porteous; with loops, spins and stall-turns this sprightly three-seater almost rivalled the spectacle afforded by the high-speed jets on show. A speed-range of 28-126 m.p.h. and a take-off run of 135 yd, will ensure the popularity of the Aiglet for private, training and agricultural purposes. The price (with reconditioned Gipsy Major I of 130 h.p.) is only £1,150.

Auster Autocar. Likewise Gipsy-Major-powered, and comfortably fitted for pilot and three passengers, the Autocar attracted private-fliers inspecting the static park.

Auster J.5. This third Auster was displayed in crop-dusting or -spraying guise, with hopper and external venturi. Seats are provided for pilot and operator.

Bristol 171 Mk. 3. The agility of this new Leonides-powered variant of the Sycamore was perfectly demonstrated by Mr. Swiss. A cruising speed of well over 100 m.p.h. is claimed for this five-seat helicopter, which is to be tested by B.E.A.; a number of 171s have also been ordered by the Ministry of Supply. Development has reached a final stage and the 171 is now in limited production.

AIRCRAFT AT THE SHOW...

Bristol Brabazon 1. This huge prototype comfortably took off from, and landed on, the south runway at Farnborough - on one occasion, at least, with a moderate cross-wind. Complementary to this reassuring spectacle were the unhurried, confident tones of Mr. Pegg, whose R/T instructions to his crew were relayed to the ground. Appearing deceptively slow throughout its performance, the "Brab" sailed majestically overhead at 160 m.p.h., banking to show the airscrew-shafts of the eight coupled Centaurus engines projecting from the distinctive plan-form of the 230-ft-span wing.

Bristol Freighter. Two Mk. 31s, latest versions of the Freighter, were statically displayed (with Hercules 759 engines, this type has an increased all-up weight of 42,000 lb and is distinguished by the addition of a dorsal fin.) One model was fitted for aerial fertilizing and carried three internal hoppers of six-ton capacity while the second had a fuselage compartmented to illustrate typical Freighter arrangements. A complete Hercules reposed inside the clamshell doors; stretchers were fixed in the second compartment; the third featured rearward-facing, high-backed "utility" seats; and well-upholstered seats for four occupied the tail section. G-AGVC, the phosphate-carrying Freighter, gave a successful demonstration of top-dressing at Flynlimon, S.Wales, the previous week. On a basis of £40 per flying hour, distribution costs are estimated by Bristol's as 6s 8d per acre or £5 3s 8d per ton of phosphate.

de Havilland Dove. A colourful patch of paintwork on the nose of the "static" Dove proved to be the flags of 29 nations, foreign and Commonwealth, in which over 300 of these excellent feederliners are giving service. The example shown had an exceptionally luxurious cabin for eight passengers and an external finish of white and silver with maroon nose and sides.

de Havilland Heron. The basic family similarity to the Dove of this new feederliner, powered by four Gipsy Queen 30s of 250 h.p., was heightened by the use of the same white, maroon and silver finish. With or without headwind (display conditions varied daily) Mr. Pike coaxed the Heron rapidly into the air for a quiet, fairly fast flypast. The landing-run was seen to be well within the 450-yd limit quoted by the makers. Carrying 14-17 passengers for 400 miles, the Heron has a cruising speed of 160 m.p.h. with fixed undercarriage; a retractable undercarriage is optional.

de Havilland Comet. Although a second prototype is now flying, the first Comet, G-ALVG, was again displayed by John Cunningham. Since its memorable debut 12 months ago the Comet has been fitted with boundary-layer fences midway along the leading-edge of the swept wings, but the smooth profile is otherwise undisturbed. In fact, its appearance is made even more attractive by the new B.O.A.C. finish of white upper and silver lower surfaces with dividing blue flash. Long-distance flights by this aircraft, with its unrivalled cruising speed of 490 m.p.h. at 35-42,000ft, are the only true indications of its commercial capabilities; consequently, at Farnborough the spectators' appreciation was necessarily confined to admiring the magnificent combination of speed and beauty as it swept across the airfield, and to taking note of the obviously docile handling characteristics.

Handley Page Hermes V. As the Hercules-engined Hermes IV has now begun its working career on B.O.A.C.'s Commonwealth routes, only the Theseus-powered Mk. V was demonstrated. Some improvements have been made to this splendid-looking aircraft, the world's largest turboprop transport, since its first appearance a year ago. The all-up weight has been increased to 90,000 lb (17,000 lb payload) and larger-area flaps (to be embodied in production Hermes IVs) give better take-off and landing performance. Capable of carrying 74 passengers, the Hermes V cruises at 330 m.p.h. for 2,000 miles. New airscrews have been fitted to absorb more efficiently the power (over 11,000 h.p) offered by the four Theseus. At Farnborough, the Mk. V was flown by Mr. Hazelden with No. 2 Theseus feathered throughout the performance. This included some remarkably steep turns and was generally considered to be one of the most dashing demonstrations of a large airliner ever witnessed.

Handley Page (Fesding) Marathon II. The static park offered an opportunity to inspect one of the fastest entries in next Saturday's South Coast Race - the Mamba-powered Marathon II. With its two 1,128-h.p. turboprops, this neat feederliner has a maximum cruising speed of 290 m.p.h. and a range of just over 800 miles. Passenger capacity is 18-22, but - as befits a prototype - the Marathon II has only a few temporary seats and much of the spacious cabin is filled with test equipment. The Mambas give an initial climb of over 1,700ft/min and a take-off run (to 50ft) of 850 yd.

The Marathon I, 16 of which are on order for B.E.A., was displayed in model form only.

Percival Prince. Twelve months ago the Prince had only just received its C. of A.; the degree of progress since achieved is truly remarkable. A Survey Prince has been operating in the Persian Gulf for Hunting Aerosurveys since last February, and the Shell Group has taken delivery of Princes for communications work in overseas countries, including Venezuela. A Brazilian airline and the Royal Navy are other operators. Not only the airframe but the Alvis Leonides engines and much of the ancillary equipment were new - almost untried; nevertheless, very few operational troubles have cropped up. The display aircraft was a P.54 Survey Prince III with transparent, extended photographic nose, autopilot, mountings for all types of cameras, and an eight-hour endurance. Features of its demonstration (pilot, J. Arnold) were a very steep pull-up from a fast, low-level run and the exceptionally short landing-distance made possible by the three-bladed D.H. reversing airscrews.

Scottish Aviation Prestwick Pioneer II. On the Wednesday, the new Leonides-powered Pioneer performed with a stiff headwind - which appeared to halve the take-off and landing distances of 80 and 66 yards respectively, claimed by the makers of this sturdy five-seater. The admirable slow-flying qualities were equally accentuated. With its new 550-h.p. engine, the Pioneer cruises at about 150 m.p.h. The demonstration pilot was Mr. Cappen

Short Sealand I. Flown alternately by Messrs. Brooke-Smith and Crossley, the blue Sealand was the only amphibian in the flying display. Although restricted to a "circus" appearance, it flew by healthily with the port Gipsy Queen 70 out of action. Remarkably versatile, the Sealand carries five to eight passengers in comfort at a cruising speed of 170 m.p.h.

Vickers Viscount 700. "Mutt" Summers' great confidence in the new production-type Viscount (he made the first flight from the small grass airfield at Brooklands) was further demonstrated by a very sharp climbing turn as he left Farnborough. The ensuing display included a fly-over with only one of the four 1,400-h.p. Dart turboprops working. The "700's" longer fuselage in no way affects the distinctive, distinguished appearance of the Viscount, and the white, scarlet and silver add a magnificent finishing touch. New performance figures of 338 m.p.h. cruising speed on 80 per cent power at 15,000ft were quoted for the Viscount, which enters regular B.E.A. service in 1952.

Westland-Sikorsky S-51. Military versions of this Leonides-powered helicopter (Dragonflies) have been delivered to the R.A.F. and R.N., while Egypt, Thailand and Portugal are overseas buyers. A civil-registered, red-and-cream S-51, in the hands of Mr. Reed, gave a spirited performance.

THE STATIC EXHIBITION

Highlights of a Tour Round the Farnborough Stands

A directory of exhibitors in the static display was given in our August 31st issue, and on pages 308 to 312 in this issue is included a review of those exhibits which come into the category of auxiliary services. Hereunder, therefore, we are confining ourselves to brief mention of those items which took our attention during a tour of the stands. As ever, the standard of display achieved by all the exhibitors was of a high order and, too often, it was difficult to get through the press of people to see what was shown.

Kelvin and Hughes (Aviation), Ltd., have developed an interesting new directional gyro presentation, which "matches" that of the gyro-magnetic compass. When the course pointer is brought parallel with the "tramlines" spanning the instrument face, the heading of the aircraft is correct.

B. Attewell and Sons, Ltd., were exhibiting a very neat line in Perspex table-ware. Nesting cups and socketed trays, together with saucers, plates, dishes, "glasses" and jugs, all designed especially for aircraft use, formed an attractive display.

Among the landing lamps shown on the Harley stand was a particularly neat design, for high-speed aircraft, which incorporated an electric screw-jack for extension and retraction, with a slipping clutch to permit the unit to blow back if a given air speed is exceeded with the lamp extended.

One of the latest developments to come from the Triplex Safety Glass Co. is Perspex/rubber bonding, and a motorized model, together with a screw-jack demonstration, showed not only the flexibility, but also the shear-strength properties possessed by this development.

Savage and Parsons, Ltd., have evolved a general-purpose automatic plotting table for use in conjunction with their strain-gauge recording equipment. The table is capable of handling up to 50 graphs in groups of 5, 10, 25 or 50 plots.

On the Ministry of Supply stand, one of the chief items of interest was a twin-chamber "hot" rocket unit which, although prototyped by the R.A.E., is to be manufactured by Faireys. The oxydiser is hydrogen-peroxide (presumably a high concentrate) but the fuel was undisclosed. One feature of the design is the employment of two similar-capacity reaction chambers, one above the other, the lower having an articulated mounting so that the inclination of its thrust axis is variable relative to that of the upper chamber.

King Aircraft Corporation have developed a new version of the pilot's harness inertia lock which, weighing but 4¼ lb, has been tested at loadings progressively up to 40 g after 2,000 repeat loadings at 1 g. The company have also done a fine job in developing their lightweight seats so that fully-adjustable twin side-by-side units have an installed weight of only 47 lb.

In one corner of the M.L. Aviation stand was a servo control unit which the company have developed and manufactured to R.A.E. design. Intended for application to primary flight-controls, the unit embodies a variable-stroke hydraulic pump as the source of supply.

In addition to showing the console of the latest type Link trainer, and a specimen blind-flying panel, Air Trainers, Ltd., exhibited a single-axis computer designed for incorporation into a visual-landing trainer. Determination of instantaneous angle of attack - involving the short periods in pitch and the pitch-trim parameters - is effected electronically. Computation of the resulting normal and "air speed" accelerations and their integration is also performed electronically.

Tiltman Langley Laboratories, Ltd., exhibited a most ingenious flow valve which, capable of being remotely controlled by electrics, hydraulics or pneumatics, not only provides perfect sealing, but can deal with highly corrosive or combustible liquids or gases, offers low resistance at all flows and pressures, can operate at high pressures and flow rates, and also provides instantaneous or gradual operation.

With a blade form reminiscent of the airscrews used during the first two decades of the century, the Viscount airscrew exhibited by Rotol, Ltd., features virtually every modern (airscrew) convenience. The straight leading edge is, in fact, a manufacturing expedient for the beryllium-copper sheathing to the glass-cloth/wire woven heating elements for de-icing.

An entirely new form of accumulator was exhibited by Vennere in a variety of sizes, all of which have sizes that are half, and weights that are one-third to one-fifth of those of conventional accumulators of comparable capacity. Furthermore, these new accumulators have a very much longer life than the normal lead-acid types and, in addition, it is claimed that they can be left charged, semi-charged, or can be fully discharged, without harm.

The G.Q. Parachute Co. had on show their new vane-type auxiliary parachute which incorporates radial membranes running down from the gore-seams of the canopy, the design being stated to provide enhanced and "foolproof" opening characteristics.

Flow-dividers have been a British Messier speciality for some little time, but the latest version is one which, by means of a simple cable-to-valve linkage between the halves of the service, stops movement of one half if a pipe-line fracture to the complementary half should occur.

A new self-sealing snap-on pipe coupling has been developed by the Exactor Control Co., and even whilst still subjected to full-scale flow under pressure, a simple turn of the coupling allows the halves to be seperated literally without spilling a single drop of fluid.

The turbo-starters developed by British Thomson-Houston are neat little units and, to quote but one example, the Type QT 22 has an output of 350 h.p. for a weight of 39 lb.

Joseph Lucas had on view their combustion heater for de-icing application. The first paraffin-burning unit of its type to have gained stage "A" approval, the unit weighs 75 lb and provides hot air at a constant pre-set temperature under all conditions of aircraft operation.

In addition to the well-known Hydro-Booster, Faireys exhibited typical undercarriage hydraulic units, and had a neat demonstration panel showing the operation of their arrester-hook damper system.

Toilet-servicing is one of the less pleasant

THE STATIC EXHIBITION...

aspects of aircraft operation, but in order to make this task as congenial as possible, Air Service Training have developed toilet-servicing trolley units which are completely self-contained and of admirably neat design.

Their new motorized gate-valve was demonstrated on the Teddington Controls stand, and would seem to be assured of a good future. Cyclic de-icing switchgear and engine-starting time-switch units of most ingenious design were also displayed.

A new radio altimeter of frequency-modulated type was exhibited by Salford Electrical Instruments. This device has a range of from 50 to 5,000ft without manual range-switching, and gives an accuracy of 3ft to plus and minus 3 per cent. High rates of climb and descent are catered for, and it is possible for the pilot to select any one of 20 specified heights at which special warning will automatically be given.

Displayed in a show-case with sporadically energized flames, the new re-setting type magnetic fire-detection switch developed by the Graviner Manufacturing Co., engaged considerable interest. These very small units function according to the Curie-point of a metallic element, by which term is meant that temperature at which the magnetism of the element undergoes a change.

One of the more important safety devices to have been developed in recent years was shown by E.K. Cole, viz., Exco cloud and collision warning radar equipment. With a maximum cloud-detection range of 40 miles, the set also gives "map-painting" and is quite capable of picking up, for example, small aircraft at about five miles, larger types at 10-12 miles, and medium-sized ships at 25 miles.

Perhaps the largest and certainly the heaviest exhibit shown in the external park was the mobile crane developed by John Curran for the movement and recovery of damaged aircraft. Its 32 tyres permit the crane to lift 80 tons even on soil bearing-strengths as low as 20 lb/sq in, and three of these cranes could handle a heavier aircraft than the Brabazon.

An attractive innovation in wheel chocks was shown by the Pyrene Company. Consisting of a collapsible ramp and a flexible shoe, the chock will hold an aircraft against full thrust without the use of brakes, and two chocks with one shoe provide an effective anchorage for parked or picketed aircraft.

POWER UNITS

As a review of Britain's aircraft piston engines is given on pages 303 to 307, we shall here deal only with the turbine units which were displayed. (Illustrations appear on pages 306-307.)

It would be difficult to say which aroused the more interest, the Sapphire or the Orenda, so it seems fairest to deal with all turbines in alphabetical order. Described by Armstrong Siddeleys as the world's most powerful turbojet, the Sapphire is an axial-flow unit with an annular combustion chamber. With the remarkably high rating of 7,200 lb static thrust for a dry weight of 2,500 lb, and with a fuel consumption of 0.907 lb/hr/lb thrust, some idea of the Sapphire's capabilities was given by the demonstration in the flying display of the experimental Meteor 8 in which two of these units are installed. It should also be mentioned that the Sapphire recently completed a 150-hour Service type test at 7,200 lb.

Alongside the Sapphire was a show-piece Perspex-cowled Python. This unit, with a type test rating of 4,000 h.p., is Britain's most powerful turboprop. The leading design features are a 14-stage axial compressor, 11 combustion chambers and a two-stage turbine, and Pythons are being built as standard power units for the Westland Wyverns ordered by the Royal Navy.

The Armstrong Siddeley Mamba turboprop which, rated at over 1,000 h.p. (plus jet thrust) is probably the most compact unit for its output ever produced, was not on view (except in the Apollo), but the Double Mamba which, as its name implies, consists of two Mambas united by a common air intake and gear casing for driving independent co-axial airscrews, was both shown on the stand and could be seen in the flying display powering the Fairey 17 and Blackburn Y.B.-1 anti-submarine aircraft.

By contrast with the larger units, and so small and slim that it looked almost like a toy, the Adder (which is a turbojet development of the Mamba) was a centre of attraction. The unit was sectioned, so that its ten-stage axial compressor, six combustion chambers and two-stage turbine could be inspected, and the central boss at the intake annulus is extended to form a long streamlined "snout" in which is housed the starter unit.

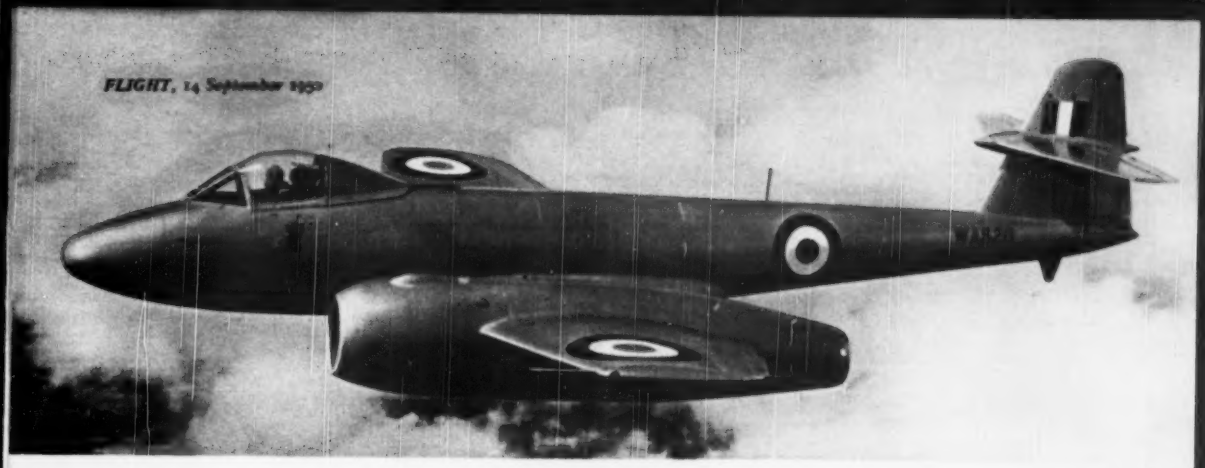
The Avro Canada Orenda (manufactured, like the Sapphire, by a member company of the Hawker Siddeley Group) was shown on the Group's stand in the static exhibition. Although not given the high-gloss "showroom" finish of the more familiar power units on view, the axial-flow Orenda (over 6,000 lb thrust) nevertheless looks to be a remarkably purposeful unit, and exhibits workmanship of an encouragingly high order. The six combustion chambers, incidentally, are fat, straight-sided cylinders.

On the Bristol stand was a beautifully finished Proteus which, rated at over 3,000 h.p., is, like the Python, a "reverse-flow" design, but employs a 12-stage axial compressor, delivering into a final centrifugal unit, to feed the eight combustion chambers. The Proteus has two turbines, the first one of which (a two-stage unit) drives the airscrew, whilst the second drives the compressor. Coupled Proteus units, driving co-axial airscrews, have been developed for installation both in the Saunders-Roe Princess and the Brabazon II.

The de Havilland Engine Company, in addition to a sectioned Goblin turbojet, had two particularly interesting exhibits on view, namely, a sectioned Sprite rocket motor, and a sectioned Ghost with variable-area outlet nozzle for employment with after-burning. The Sprite is a "cold" rocket, using concentrated hydrogen-peroxide as fuel, and either calcium- or sodium-permanganate as a catalyst. Weighing 925 lb, the unit gives a total impulse of 55,000 lb-second, with a maximum thrust of 5,000 lb for a duration of 9 seconds. The empty weight is 350 lb.

The variable-area nozzle exhibited on the Ghost was of rectangular type, the side panels being fixed, whilst the top and bottom panels are movable by means of a simple, toggle linkage actuated by pneumatic rams on each side. The design looked to be eminently straightforward and robust, and is a forthright and attractive attempt at solving the variable-area nozzle problems. The internal faces of the nozzle are cold-air cooled, and the maximum reduction in outlet area is of the order of 35-40 per cent.

Despite the fact that the latest Rolls-Royce Avon put up such an impressive show in the Canberra B2 and the adapted Meteor 4, it could not, for security reasons, be included among the exhibits on the company's stand. However, sectioned examples of the Nene and Derwent turbojets and the Dart turboprop were shown, the superlative finish for which Rolls-Royce are remarkable being further enhanced by colouring the internal surfaces of the units to illustrate temperature change.



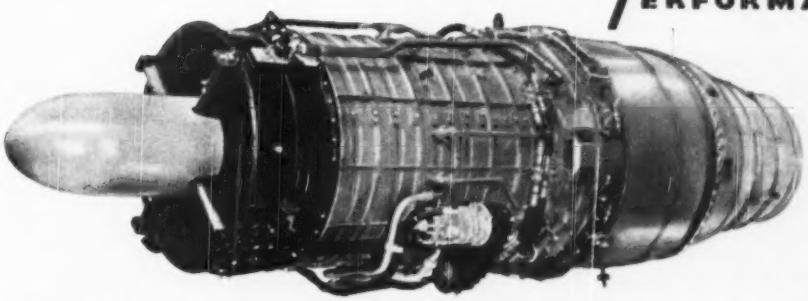
Type-tested flight-tested and now flying in the Sapphire Meteor

12,000 THRUST HORSE POWER at 600 m.p.h.

THE ARMSTRONG SIDDELEY PURE JET

Sapphire

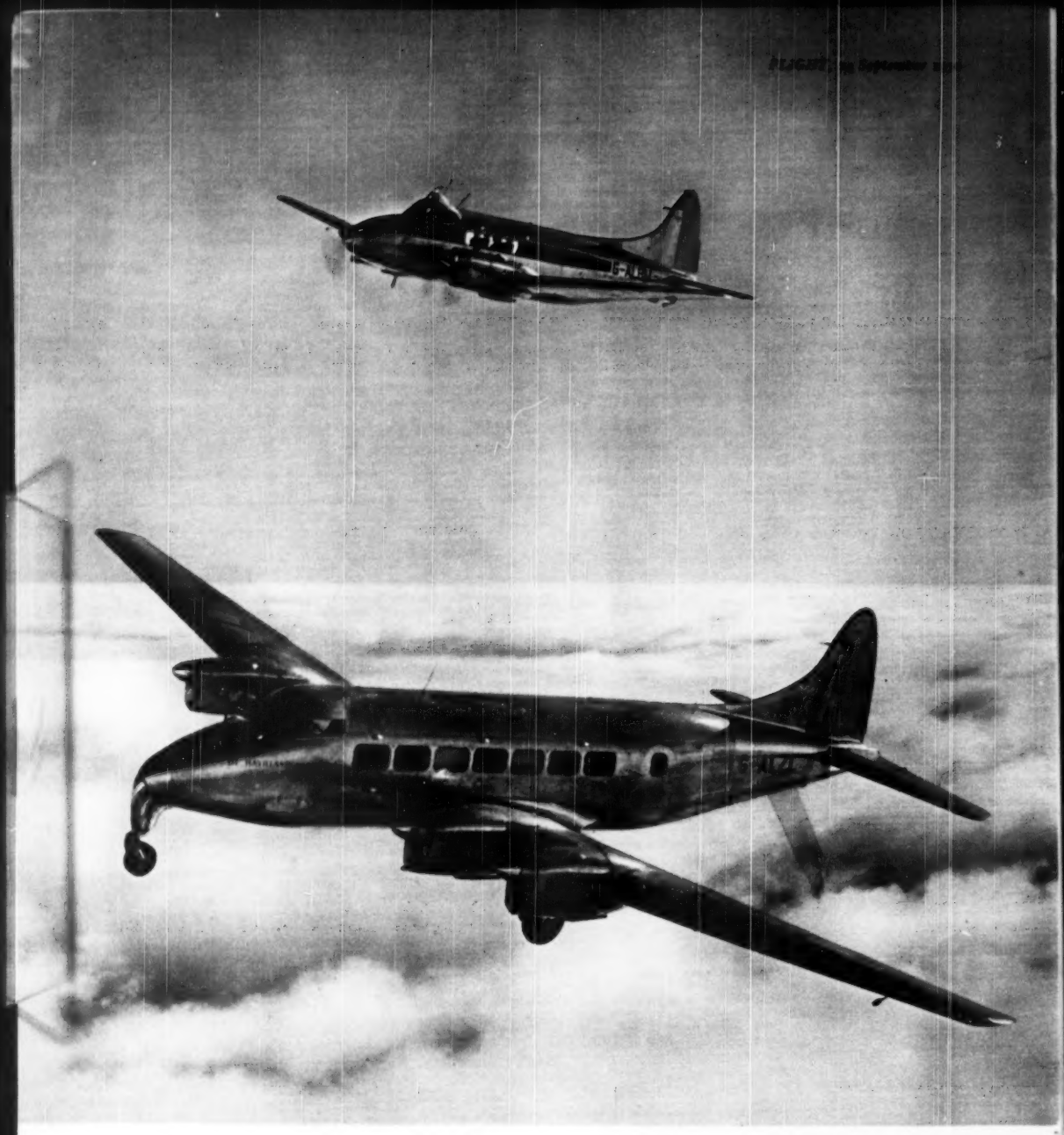
POWER / PERFORMANCE



ARMSTRONG SIDDELEY MOTORS LIMITED

Member of the Hawker Siddeley Group

Coventry

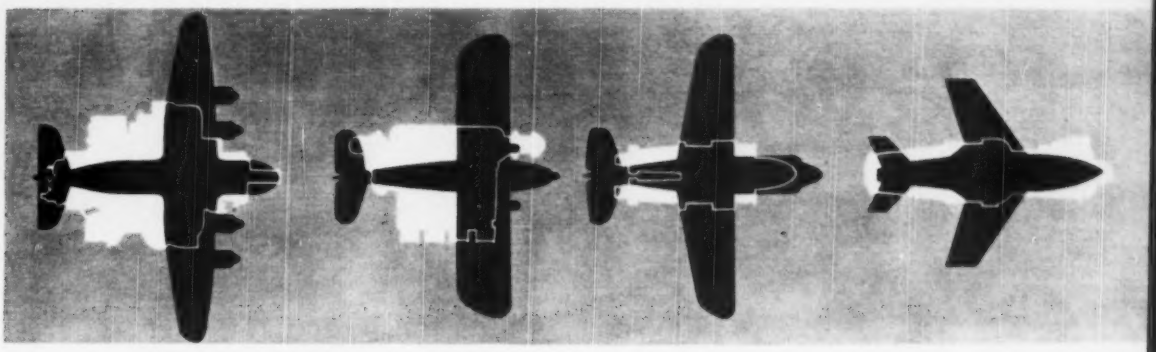


The Dove: 8 passengers with 44 lb. of baggage each, representing a payload of 1,670 lb., cruising at 179 m.p.h. over a practical stage-length of 340 miles with full fuel allowances for take-off, climb, a 230-mile diversion, descent and 45 minutes' stand-off

The Heron: 14 passengers with 44 lb. of baggage each, representing a payload of 2,750 lb. cruising at 160 m.p.h. over a practical stage-length of 400 miles, with full fuel allowances for take-off, climb, a 230-mile diversion, descent and 45 minutes' stand-off

DE HAVILLAND

unequalled experience in the light transport field



BRITAIN'S POWER UNITS

PROGRESS with the large variety of power units manufactured in this country has, on the whole, been very satisfactory since last year's S.B.A.C. Exhibition. During the early part of the year national attempts to economize had the effect of retarding development of certain aircraft and engines and, in fact, it might have been hoped that work on several power units would have been more rapid. High priority has, however, been given to the development of the Avon turbojet, which figures largely in rearmament plans and is indicative of increasing concentration on axial-flow designs. The recent introduction of the powerful type-tested Sapphire is especially welcome. Such units as these two, with their very high power-ratings but low weight and frontal area and promising fuel consumption figures, offer new opportunities to aircraft designers.

Expectations of the later marks of Proteus turboprop for Bristol 167s and Princesses are high. Among the smaller members of this class of power unit, the successful trial operation on scheduled passenger services of the four Darts in the Viscount constitutes a milestone in development progress.

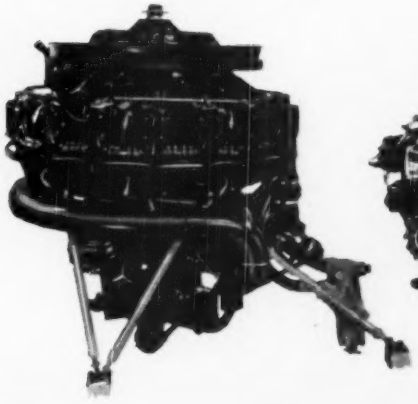
Among large civil piston-engines the year has seen further detail refinements and increases in overhaul periods. Similar improvements have occurred among the light-aircraft engines.

The need to provide adequate take-off power under all conditions has been exercising the minds of engine designers, and practical experience has been gained with gas turbines operating from high, hot and humid airfields abroad. Work has proceeded with afterburners (reheat) for military units, and with water/methanol injection, both for turboprops and for large piston engines such as the Griffon. High-grade fuel—115/145—has found increasing application where extreme power is needed for short periods.

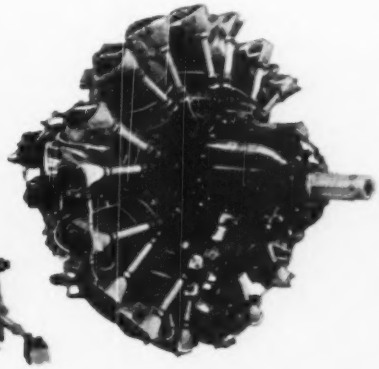
Alvis Leonides

A NINE-CYLINDER, single-row radial producing over 550 h.p., the Leonides is the only British engine in its power-category. It was designed before the war, which set back development considerably, but since November, 1945, when the Leondes passed its type-test at 500 h.p., it has been further developed and improved. Flying in passenger, survey and Naval versions of the Percival Prince, the Leonides is giving particularly good service. Without major modification, the engine has been converted into a vertical-drive power-unit for a number of helicopters. Clutch and cooling fan are added, the oil system modified and the reduction gearing normally omitted for helicopter operation. The reduction gear is retained, however, when the Leonides replaces the Wasp Junior in the Westland-Sikorsky S-51, now in quantity production and service. Principal marks of this engine are 23 H.M.V. (helicopter unit) and 502/4 (both with a maximum rating of 570 h.p. at 3,200 r.p.m.). At Farnborough it was also seen installed in the new Prestwick Pioneer.

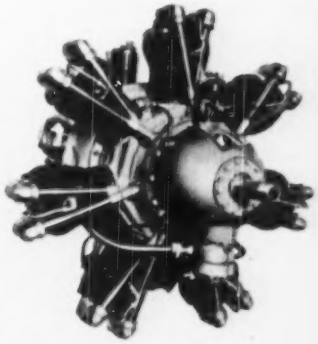
Alvis Leonides helicopter power plant.

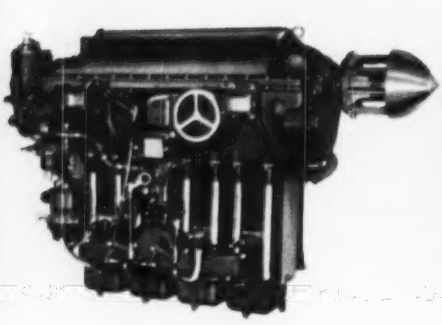


Alvis Leonides.

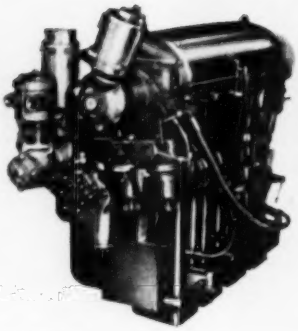


Armstrong Siddeley Cheetah.

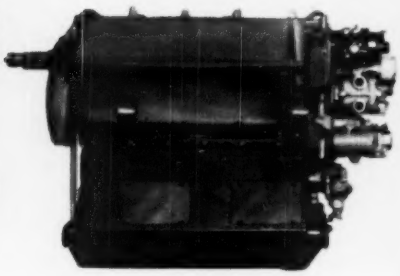




Blackburn Cirrus Minor II.



Blackburn Cirrus Major III.



Blackburn Cirrus Bombadier.

BRITAIN'S POWER UNITS...

Armstrong Siddeley Cheetah

THIS seven-cylinder, 13.67-litre radial engine began its highly successful life in 1932. It has been associated mainly with Service trainers and, by the end of the war, Cheetah production totalled 35,000. It is still in use—notably as the power-unit for Ansons, Oxfords and Consuls—and has been adopted in slightly derated form to power the new Handley Page (Reading) and Percival basic trainers, so further life seems assured. Modifications to fuel system to permit aerobatics will probably be embodied, but the basic design will be unchanged. Current power-ratings for recent Cheetahs are 430 h.p. (max.) and 265 h.p. (economical cruising).

Bristol Centaurus

BASICALLY, the Centaurus is a 3,000-h.p., 18-cylinder, sleeve-valve radial engine; its character changes considerably, however, according to application. One of the newest developments is the Centaurus 661, with torquemeter, developed as a complete power-unit for the Airspeed Ambassador, featuring petal-opening cowlings, flexible mounting and fuel-injection. This version is rated at 2,700 h.p. Reliable service has been given recently by the coupled-Centaurus units of the Brabazon I and by several Centaurus-powered military aircraft. Much of the manufacturers' energy is now being devoted to increasing steadily the period of hours between Centaurus overhauls, the essential prelude to economical civil usage.

Bristol Hercules

PROBABLY the most widely used of large British piston engines, the Hercules, in the 2,000-h.p. bracket, is a two-row, 14-cylinder, sleeve-valve radial. An overhaul period of 1,000 hours has now been authorized for Hercules powering certain Vikings, and a larger period still may soon be permitted. Most marks have two-speed superchargers; a typical unit, the 264, is rated at 2,000 h.p., and is equipped with torquemeter and provision for reversing airscrews. This version is specified for the Universal Freighter. Petal-cowled, exceptionally clean installations have been produced for the Hermes IV (Mk 763), Varsity (illustrated)—and the projected Vickers V.C.3. Later marks have been permitted higher take-off powers—for the 763, the maximum is 2,100 h.p.

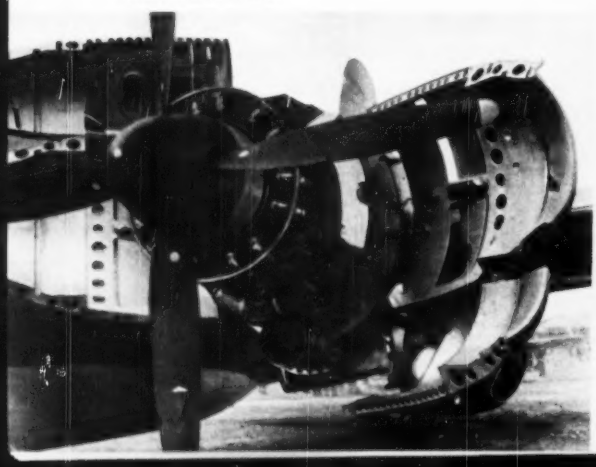
Blackburn and General Aircraft Cirrus Minor and Major

THESE are four-cylinder, air-cooled, inverted engines for light aircraft; the smooth-running Minor II is rated at 100 h.p. and the Major III at 155 h.p. Both types have become increasingly popular with makers and operators of several light-aircraft designs. For air racing, long stretches of "full-bore" engine running are entailed, and machines with standard Cirrus Minors have shown up well at several meetings. Provision has been made for operation with v.p. airscrews in special versions of both Minor and Major.

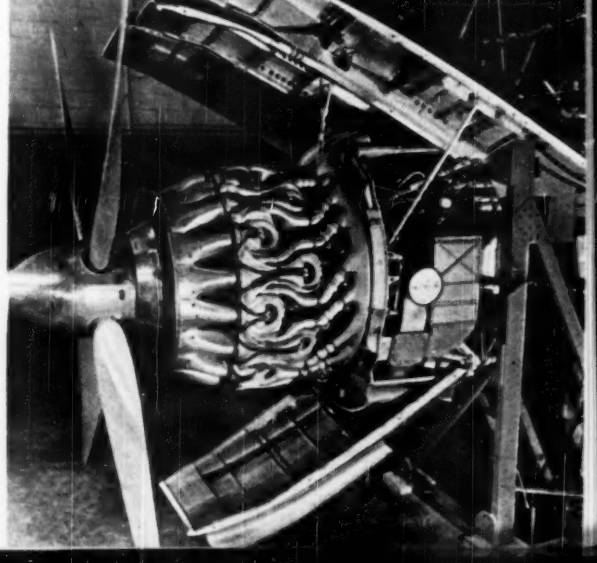
Cirrus Bombardier and Grenadier

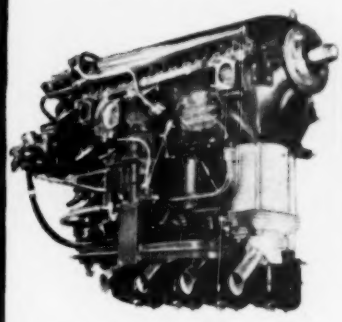
THE Bombardier—a four-cylinder inverted unit with underhead camshaft—is the first of a new series of Cirrus units, of more modern conception than the well-established engines mentioned above. Although its development has, necessarily, been slow, the Bombardier has passed type-tests, is now rated at 180 h.p., and will be installed in a new light military aircraft. Successful service usage—with civil adoption as a probable consequence—can therefore be foreseen.

Bristol Hercules 264.

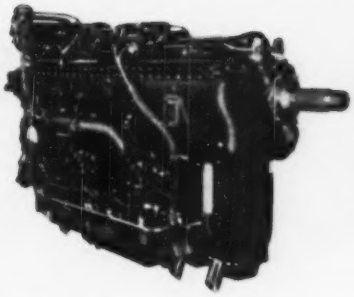


Bristol Centaurus 661.

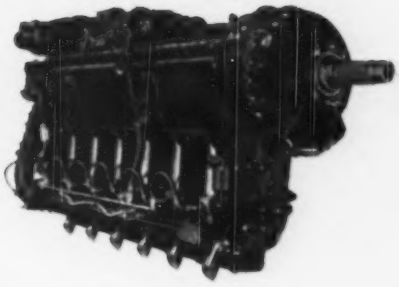




D.H. Gipsy Major 10.



D.H. Gipsy Queen 30.



D.H. Gipsy Queen 70.

The Grenadier, giving over 300 h.p., is a six-cylinder development (in the same series as the Bombadier) which has reached the type-test stage. It is of particularly advanced design and has direct fuel injection and a neat system of accessory-grouping. Largest of the Cirrus line, it has six inverted, air-cooled cylinders of 9.79 litres total capacity and an underhead camshaft. Further development of this promising engine depends largely on adoption for service or civil use.

De Havilland Gipsy Major

OVER 18 years' development of the original Major I design underlies widespread introduction of Major 10, four-cylinder, inverted, air-cooled engine of 145 h.p. This engine—basically similar to its predecessors—has gone into large-scale service as the power-unit for a variety of light post-war designs, a notable instance being the Chipmunk. Its use with v.p. airscrews has been approved and electric or cartridge starters, generator and vacuum pump may be fitted; full screening for radio is provided. The Major 10 shows every sign of upholding the enviable reputation of its forbears. Good grouping of auxiliaries gives a compact yet accessible power-unit.

De Havilland Gipsy Queen

PROMINENT among the unsupercharged, direct-drive versions of the six-cylinder air-cooled Queen series is the 30 Mk 2, as fitted to the Prentice and Heron. It is rated at 150 h.p. for take-off and offers much of the simplicity of the popular Gipsy Six line, still serving faithfully in such types as the Rapide. As a suitable power-plant for a Rapide replacement, this version may well continue the successful "Six" career for many more years.

Single-stage supercharging and a 0.711 : 1 reduction-gear charaterise the 70-series Queens which, like the normally aspirated units, have cylinder-capacity of 10.178 litres. The Queen 70 Mk 4, developed for the widely used Dove feeder-liner, has a take-off power of 340 h.p. and was recently approved for unlimited time at max. cruising power (at 8,000 ft). The manufacturers were forced into rather hurried post-war introduction of the 70-Series Queens, but good serviceability has now been achieved.

Jameson

BRITAIN'S only surviving flat-four light engine is the 3.28-litre, 106 h.p. Jameson unit. Flight experience has been gained in the Cierva Skeeter I helicopter.

Rolls-Royce Merlin

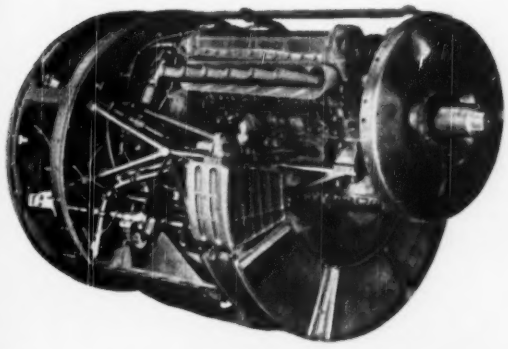
THE name Merlin, among the most illustrious in the history of aircraft engines, has come to cover a remarkably diverse range of versions of the same engine—military, civil and marine. All types of Merlin are of the basic 12-cylinder, supercharged liquid-cooled vee layout with high-altitude versions having two-speed and two-stage supercharging; Mk 130 and 131 "handed" units power the Hornet, which has one of the cleanest, most compact installations ever designed, and versions with contra-rotating airscrews are in service. Merlin-powered Lincolns, Lancasters, Mosquitoes and Spitfires continue to do outstanding work, and de-rated, 1,220-h.p. Merlin 35s promise long-life, economical operation in the R.A.F.'s new Balliol advanced trainers.

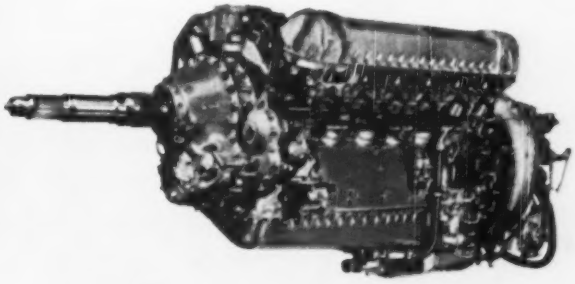
The Merlin 626 civil power-unit, as used in B.O.A.C. and T.C.A. Canadair Fours, is one of the latest and most important developments. Rated at 1,760 h.p. for the take-off, the 626 is contained in an interchangeable installation with light-alloy radiator—a recent development which affords a 432-lb weight-saving per aircraft and exemplifies continued efforts to increase the efficiency of this valuable engine.

Rolls-Royce Griffon

ALL the Merlin's salient features are reproduced in the larger Griffon, which has a capacity of 36.7 litres, compared with the Merlin's 27. First a military power-unit, the Griffon supplies, in most forms, high power—normally over 2,000 h.p.—at low and medium altitudes. One of its latest applications is in the new Shackleton for Coastal Command; like the Shackleton, the Seagull has contra-rotating airscrews—driven on the commendably simple principle of inserting an idler pinion in the spur-type reduction gear to drive a second airscrew shaft.

Rolls-Royce Merlin 620.



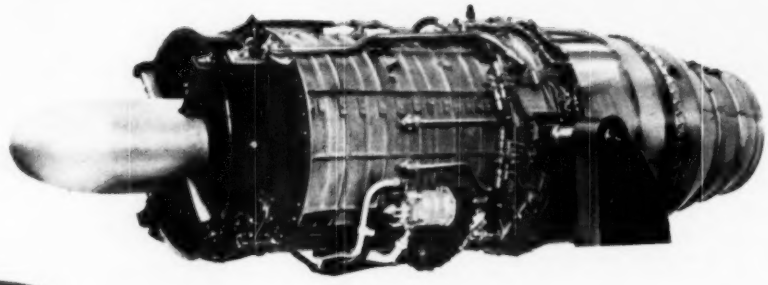


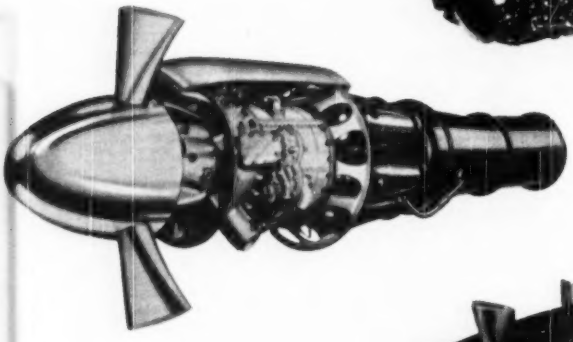
Rolls-Royce Griffon 57.

BRITAIN'S POWER UNITS..

TURBOPROPS and TURBOJETS

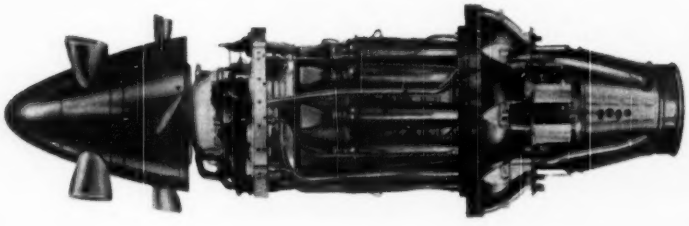
Armstrong Siddeley Sapphire.

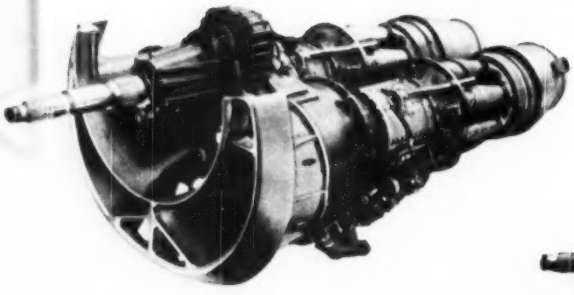




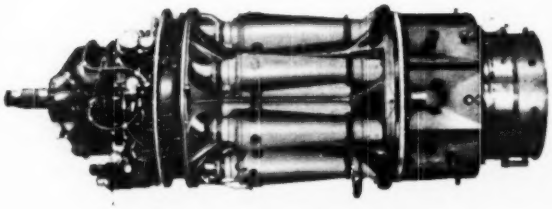
Armstrong Siddeley Mamba.

Armstrong Siddeley Python.

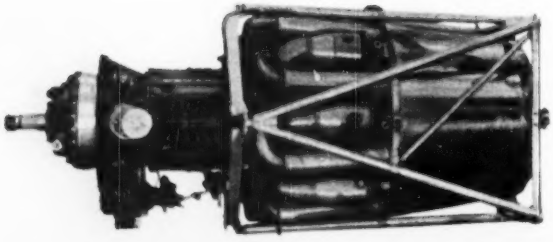




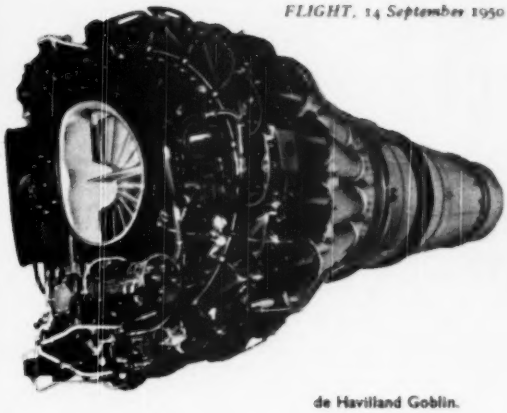
Armstrong Siddeley Double Mamba.



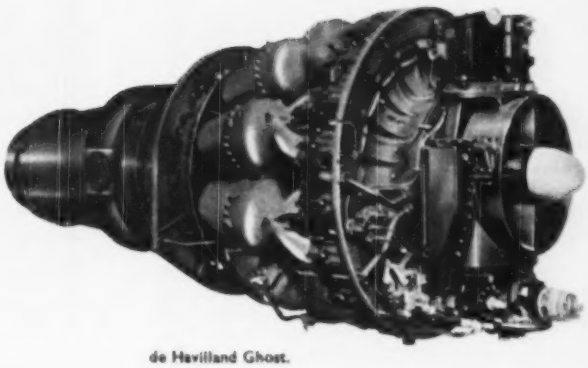
Bristol Proteus.



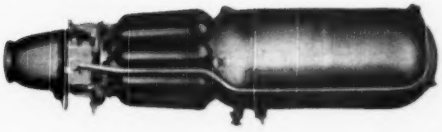
Bristol Theseus.



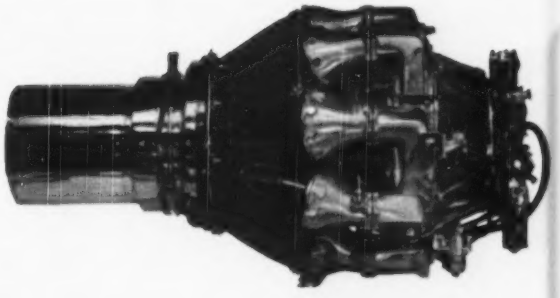
de Havilland Goblin.



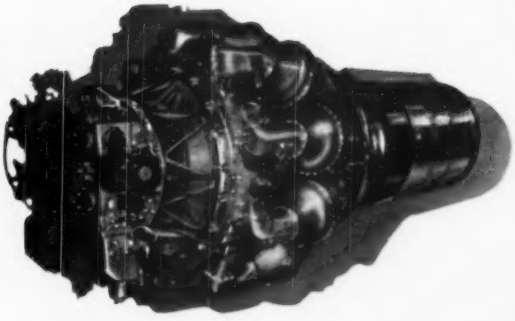
de Havilland Ghost.



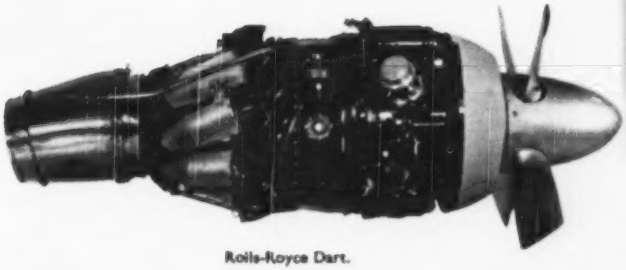
de Havilland Sprite.



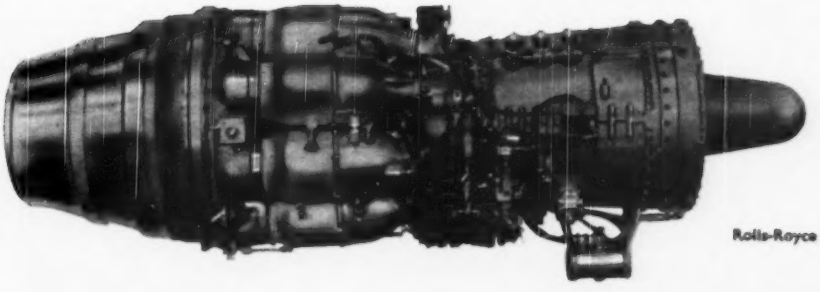
Rolls-Royce Derwent.



Rolls-Royce Nene.



Rolls-Royce Dart.



Rolls-Royce Avon.

AUXILIARY ASPECTS

A Classified Review of the Aircraft Services and Major Components on View at Farnborough last week

BY the very nature of the S.B.A.C. static exhibition, by its size and detail, it is virtually impossible for any one person, in the few days available, to absorb details of everything displayed. To afford some help in this direction, however, those exhibits which come into the categories of auxiliary services and major components are here listed under their appropriate section heads. This review must, necessarily, be brief, but it is as comprehensive as it can be made within these limits; in conjunction with our seven-page summary, published Aug. 31st, of the individual exhibits coming outside these special categories, it will serve as a future source of reference. That the review is in the present tense is explained by the fact that, had not the printing dispute intervened, we should have published it during the Show. Additional notes on some of the exhibits appear in our Show report (pages 301—302).

AIRSCREWS

De Havilland Propellers, Ltd., Hatfield, Herts (Stand F), are exhibiting a bracket-type 1,000-size airscrew in connection with a Gipsy Queen 30 power plant as used on the Heron; a three-blade feathering and reversing unit, mounted on a Gipsy Queen 70 power plant, as used on the Dove and Devon; and a complete eight-blade co-axial assembly, designed for the Saunders-Roe Princess flying boat. These exhibits are representative of the enormous range of airscrews made by the company for power absorptions of from 100 to 10,000 h.p.

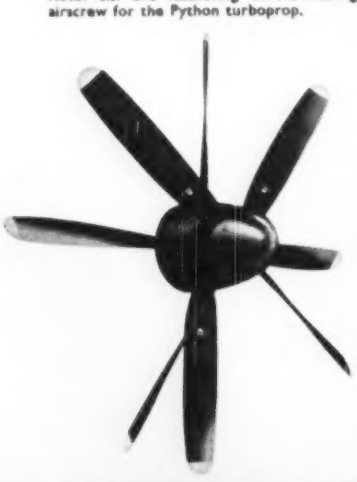
The Fairey Aviation Co., Ltd. (Propeller Division), Hayes, Middlesex (Stands D and 95) are still producing fixed-pitch Fairey-Reed airscrews in quantity and have recently developed two new types of airscrew for gas turbines. Both are electrically operated, but Type 1 employs engine-driven gearing for the reverse pitch function to obtain a pitch-change rate of 36 deg/sec. The Type 2 Motogenic airscrew incorporates an electric generator with an output of 17 kW at 110 v. Normal pitch-change is 10 deg/sec, and 24 deg/sec for reverse pitch. The company is also experimenting with a new form of hollow steel blade.

Hordern-Richmond, Ltd., Haddenham, Bucks (Stand 122) have on view examples of variable-pitch blades and fixed-pitch airscrews in Hy-du-Lignum, the laminated improved wood for which the company is famous, together with helicopter main- and tail-rotor blades. Aeromatic airscrews are also shown, Hordern-Richmond, Ltd., having exclusive manufacturing and selling rights for these units in this country. Two models are being produced, the F200, suitable for engines of from 65 to 150 b.h.p., and the F220, suitable for engines of from 155 to 330 b.h.p. The respective weights are 28lb and 48lb.

Jablo Propellers, Ltd., Mill Lane, Waddon, Croydon, Surrey (Stand 138) exhibit various examples of Jablo airscrew blades, together with a display of the operational sequences in blade construction, emphasizing suitability for mass production.

Rotol, Ltd., Cheltenham Road, Gloucester (Stand 160) are showing a four-blade airscrew designed for the Dart-Viscount; a new lightweight three-bladed airscrew for piston and turbine engines of from 500 to 1,000 b.h.p.; airscrew strain-gauge equipment; and auxiliary-drive equipment of the latest kind. As befits their position as one of the leading manufacturers of airscrews in the world, the company produce a very large range of airscrews, from small two-blade constant-speed and feathering types (incorporating integral governor units) up to the mighty six- and eight-blade contra-rotating and co-axial units such as employed on the Westland Wyvern and Bristol Brabazon. Synchronization equipment has also been developed for the elimination of the low-frequency beat in multi-engined types when running at different r.p.m., and to obviate the necessity for manual speed adjustment.

Rotol c.s. and feathering contra-rotating airscrew for the Python turboprop.



CABIN ATMOSPHERE CONTROL

D. A. Daniel and Co., Ltd., Machynlleth, North Wales (Stand 131) are manufacturers of heating equipment of a variety of kinds, and are exhibiting a range of Dragonfly heaters of 62,500, 125,000 and 250,000 H.T.U./hr capacity, together with the various accessories which go with this equipment. In addition, the company's Dragon-type general-purpose heater is shown, with a functional unit on which the operation of the equipment is readily simulated for demonstration purposes.

Delaney Gallay, Ltd., Vulcan Works, Edgware Road, London, N.W.2 (Stand 79) have on their stand examples of the range of heat-exchangers they manufacture for heating and cooling cabin air. One of the latest types is a steam heater utilizing exhaust waste heat without the risk of carbon monoxide contamination. An ozone generator for cabin use is also displayed.

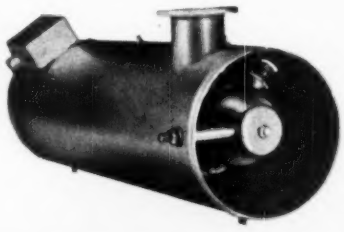
Sir George Godfrey and Partners, Ltd., Hampton Road, Hanworth, Middlesex (Stand 16) have achieved a world-wide reputation in their specialized field, and are exhibiting, as representative of their range of products, a series of air-cycle cold-air units as used on the Vampire 5, the Avro Canada CF100, the Hermes and Viscount, together with various models of their Rootes-type cabin blowers, among the latest of which are those used on the CF100 and the Hermes IV. In addition, the company's Mk 1C pressure-test ground trolley is on view, and the larger, self-contained mobile conditioning truck is to be seen in the aircraft park.

M.L. Aviation Co., Ltd., White Waltham Aerodrome, Maidenhead, Berks. (Stand 152) are showing portable air-conditioning plant for ground-cooling aircraft cabins, the small Coolair and Coolair Minor conditioning units being complemented by the larger, mobile Coolairvan, which is exhibited outside in the aircraft park in conjunction with the Vickers Viscount.

Marston Excelsior, Ltd., Fordhouses, Wolverhampton (Stand 39) in a section devoted to heat-exchange equipment, display a high-temperature pressure-air/air heat exchanger for use in cabin conditioning systems.

Normalair, Ltd., Yeovil, Somerset (Stand 9) are singular amongst British concerns in their specialization on cabin-conditioning control equipment, and the company's products are fitted in all British-designed, three Empire-designed and one French-designed pressurized aircraft. Together with an animated flight-plan model, showing the effect of cabin pressurization, the following sectioned items of Normalair equipment are exhibited: pressure controllers, discharge valves, mass-flow controllers, metering head, flow-control valves, flow-indicator transmitter, constant-flow valves, ground pressurizing connections, humidifier pump and accessory unit, non-return and inward-relief valves, heating choke valve, pressure-relay valve, relief valve and reducing valve.

D. A. Daniel 62,500 B.T.U./hr Dragonfly surface combustion heater.



AUXILIARY ASPECTS . . .

Siebe, Gorman and Co., Ltd., Davis Road, Tolworth, Surbiton, Surrey (Stand 12) are perhaps the oldest-established safety engineers in the world, and are exhibiting various types of oxygen breathing apparatus, together with a complete oxygen circuit, portable oxygen equipment, ground-test equipment and an oxygen-charging trolley. Among the company's latest developments are a new lightweight oxygen line, and new designs of control valves, cylinder valves and regulators.

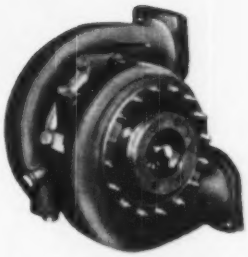
Teddington Controls, Ltd., Cefn Coed, nr. Merthyr Tydfil, South Wales (Stand 84) are showing the latest development of their electronically operated cabin-temperature controller. Whereas, in the past, cabin temperature has been regulated according to the dry bulb temperature readings, the new development, by the incorporation of a humidity element, enables the system to be controlled in relation to effective temperature and, by this means, ensures a greater degree of passenger comfort.

Vokes, Ltd., Henley Park, Guildford, Surrey (Stand 46) are showing filtration and silencing equipment, designed especially for use in conjunction with cabin pressurization systems. Another exhibit is a tobacco-smoke remover for the promotion of added passenger comfort.

DE-ICING EQUIPMENT

D. A. Daniel and Co., Ltd., Machynlleth, N. Wales (Stand 131) are included in this section because the Dragonfly surface combustion heaters which the company manufacture are equally as applicable to de-icing purposes as to those of cabin heating. In that details of the company's exhibits are given in the "Cabin Atmosphere Control" section, they need not be repeated here.

Delaney Gallay, Ltd., Vulcan Works, Edgware Road, London, N.W.2 (Stand 79) are showing their latest wing de-icing heater unit in the form of a light-alloy medium-temperature heat exchanger, utilizing exhaust gas as the heat source and air as the distribution medium.



Type ACR E8 air-cycle turbine cold-air unit by Sir George Godfrey and Partners.

Delco-Remy-Hyatt, Ltd., 111, *Grosvenor Road, London, S.W.1* (Stand 88) show a series of fractional-horsepower motors which are applicable to de-icing equipment.

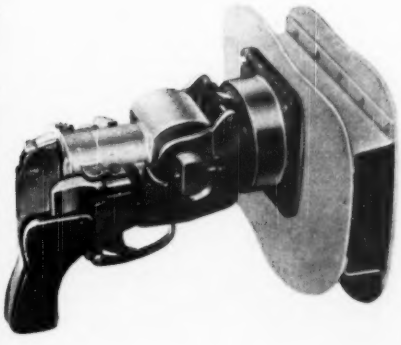
Joseph Lucas (Gas Turbine Equipment), Ltd., Birmingham, 28 (Stand 123) manufacture kerosene and petrol combustion heaters for application to thermal de-icing systems.

Rotax, Ltd., Willesden Junction, London, N.W.10 (Stand 124) are exhibiting the electronic damper they have developed, together with the associated pumps and valves, for application to pulsating overshoe type de-icing systems. The damper gives automatic damping of the inflation cycle, according to light, medium or severe icing conditions, by the operation of a setting switch.

T.K.S. (Aircraft De-Icing), Ltd., Drayton House, Gordon Street, London, W.C.1 (Stand 29) are exhibiting working models of their new porous-metal leading edge panel-type distributors, through which the de-icing fluid exudes. Photographs taken during the B.E.A. de-icing trials at the beginning of the year are on view, and show the high order of operating efficiency the system provides.

Teddington Controls, Ltd., Cefn Coed, near Merthyr Tydfil, S. Wales (Stand 84) have developed, and are producing, a cyclic timing switch to effect the periodic energizing of individual air-screw-blade heater elements. In addition, the company's well-known inching control has been found, in a modified form, to lend itself very well to de-icing applications.

M.L. Aviation Very pistol and socket for pressure-cabin installation.



ELECTRIC ACTUATION

The British Thomson-Houston Co., Ltd., Rugby (Stand 117) are world-famous in the electrical field, and produce a wide range of aircraft equipment. On the company's stand may be seen representative examples of their turbo-starters, magnetos, booster coils, A.C. and D.C. motors and generators, actuators, switches, circuit-breakers, electronic voltage regulators, together with an electronic tester for multi-cylinder engines.

Delco-Remy-Hyatt, Ltd., 111, *Grosvenor Road, London, S.W.1* (Stand 88) show a range of fractional-horsepower motors in four basic frame sizes, from 2½in to 4in diameter, which are available as series, shunt or compound types. In the same frame sizes, the company have developed a range of split-field motors for electronic control for follower devices, automatic radio compasses and similar systems.

The English Electric Co., Ltd., Queens House, Kingsway, London, W.C.2 (Stand 85) exemplify their range of aircraft electrical equipment with six rotary actuators, six linear actuators, a screw-jack, five gearboxes, one gearbox motor and compressor, a pilot's control, and a number of A.C. and D.C. motors, alternators and generators, varying from a 1/35 h.p. model up to a 16 h.p. A.C. unit. Complementing this display, the main English Electric stand (M) exhibits representative examples of wind-tunnel drives, electrical test plant for piston and turbine power units, and for engine auxiliaries, such as superchargers, compressors and so forth.

Newton Brothers (Derby), Ltd., Alfreton Road, Derby (Stand 49) are exhibiting a variety of examples of their lightweight aircraft generators, with D.C., A.C. and dual-purpose outputs; patent automatic carbon-pile voltage or current regulators for the control of A.C. or D.C. generators, or as series regulators to give constant voltage from a variable source of supply; rotary transformers and convertors for supplying power for radio receivers or transmitters and electronic equipment; and high-frequency alternators.

The Plessey Co., Ltd., Ilford, Essex (Stand 86) have a large number of new units on their stand, including Cub, Puma, Cougar, Lynx and Cheetah electrical actuators; turbine starters, cartridge starters, including the Type "S" with modified breech; and a selection of new-type Breeze wiring accessories, including a concentric plug and socket, a heavy multi-terminal plug, a ground-starter connection, a 37-pin plug and socket and a Mk. 4 bulkhead connector.

Rotax, Ltd., Willesden Junction, London, N.W.10 (Stand 124) have, within the past year, added many new items to their extensive range of aircraft electrical equipment. Of these, the high-energy ignition unit for gas turbines produces two simultaneous independent sparks nearly 120 times a minute, the energy of each spark being approximately 100 times as powerful as that produced by booster-coil systems. Other new units are the double-shot turbo-starter, which has an output speed of over 8,000 r.p.m. at 100 lb ft torque, developing a maximum of 155 h.p.; a 110-volt starter, similar to those used on the Hermes IV and V; a high-power linear actuator which, designed for 110-volt operation, has a maximum working load of 26,500 lb, a 20-in stroke and a 10-second opera-

Miles Electric actuator Type EJ 3,000 Mk 1 (Western Manufacturing Estate).

tional period; a 100-amp circuit breaker; and a continuously rated rotary transformer delivering 3 kW at 28 volts from an input of 115 volts.

Salford Electrical Instruments, Ltd., Silk Street, Salford 3, Lancs (Stand 59) are exhibiting a range of Klixon circuit breakers and motor protectors, in addition to the newly-developed Rotasol. The latter is an ingenious type of electromagnetic motor, capable of producing high torque through a limited angular travel (i.e., up to 45 deg.); it is thus suitable for step-driving a multiple gang of circuit switches and, if necessary, homing contacts can stop rotation at any required point.

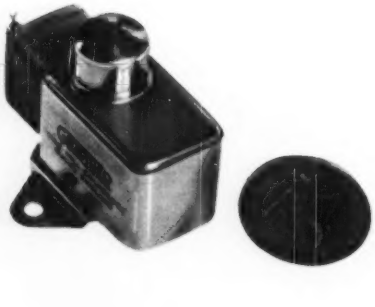
Teddington Controls, Ltd., Cefn Coed, near Merthyr Tydfil, South Wales (Stand 84) continue to manufacture their well-known range of inching controls, electro-hydraulic and magnetic valves, electro-pneumatic jacks, solenoid-operated valves, time switches and pressure switches and, in addition, are exhibiting examples of the new series of gate valves recently introduced.

Ultra Electric, Ltd., Western Avenue, London, W.3 (Stand 10) have as their principal exhibit the new composite engine control for turboprop power units. This incorporates a remote electric throttle control, r.p.m. governor, top-temperature limiter and a separate emergency throttle control, and has been specifically designed for the Proteus power installations in the Princess flying boats and Brabazon Mk. II. Complementing this exhibit are jet-pipe temperature control units, temperature selector units and an electric throttle actuator.

Western Manufacturing Estate, Ltd., The Aerodrome, Reading, Berks (Stand 73) have on show examples of some ten types of the well-known Miles electric actuators, ranging from the EJ 25 Mk. I, with a nominal operating load of 25 lb for a weight of 16 oz, up to the new EJ 3,000 Mk. 1, with a nominal operating load of 3,000 lb for a weight of 18 lb. A new development is the Type SS 125 Mk. 9 electric motor which, measuring only 2⅞in by 2¼in, has a power output of 0.1 h.p. at 10,000 r.p.m.

The Westinghouse Brake and Signal Co., Ltd., 82, York Way, King's Cross, London, N.1 (Stand 141) have on view a selection of special lightweight rectifiers for providing D.C. power supplies in aircraft. Some of the smaller assemblies are useful for operating contactor coils, or can be up-rated in current for the intermittent operation of actuators, and so forth.

Graviner magnetic fire-detection switch of latest re-setting type.



Martin-Baker automatic ejector seat Mk 3, complete with parachute equipment.

EMERGENCY EQUIPMENT

Frankenstein and Sons (Manchester), Ltd., Victoria Rubber Works, Newton Heath, Manchester (Stand 129) show constant-wear immersion suits, inflatable exposure suits, and Service and (illustrated in *Flight* of August 31st.) airline life-jackets.

The G.Q. Parachute Co., Ltd., Stadium Works, Woking, Surrey (Stand 170) are showing their very newest version of the back-type parachute, designed for use with ejector seats. In addition there is the vane-type auxiliary parachute, for which is claimed a greater degree of opening efficiency, together with a complete range of the company's "Z" type safety harnesses which, fitted to all first-line aircraft, are stressed throughout to 25 g.

Integral, Ltd., Cousins Street, Wolverhampton (Stand 52) exhibit two types of hydraulically actuated shears, developed for emergency entry into crashed aircraft. The lighter type is for continuous cutting round a section of aircraft skin and the lighter structural members, whilst the heavier type is capable of dealing with main structural and heavy sections.

Irving Air Chute of Great Britain, Ltd., Letchworth, Herts (Stand 76) have on show a variety of types of Service parachutes, including seat, observer and back-types, together with paratroop and supply-dropper parachutes. The latest version (Mk. 2) of the automatic barometric-opening device—which was recently tested (as reported in *Flight* of August 24th) by a delayed drop—is half the size and half the weight of the original device.

M.L. Aviation Co., Ltd., White Waltham, Berks (Stand 152) show their automatic ejection seat, which incorporates retractable leg guards, stabilizing drogue, seat harness, release, etc., all of which are automatically operated. Two other interesting new developments are a Very pistol which can be fired and reloaded from the interior of a pressure cabin without loss of pressurization or the escape of noxious fumes; and a harness release which is thinner than usual, and is so arranged that, when unlocked, a push-button rises and gives a tactile as well as a visual indication of its state.

Martin-Baker Aircraft Co., Ltd., Higher Denham, Middlesex (Stand R) are exhibiting the latest Mk. 3 version of the ejector seat for which the company is rightly famous. This latest design is fully automatic in action and is claimed to be effective at any speed and under any g accelerations that may occur, irrespective of aircraft attitude. A barostat is incorporated with the timing device, so that the harness locks are not freed until the seat has fallen to below 10,000ft, after which the seat drogue is released, and in so doing, withdraws the airman's parachute from the pack.

R.F.D. Co., Ltd., Catteshall Lane, Godalming, Surrey (Stand 89) are showing their two latest designs of life jacket, Type 50 (civil) and Type NZN (naval), together with a mechanical illustration of the company's rescue-dropping apparatus developed from the Lindholme gear. Photographs are also shown of R.F.D. dinghies, life jackets, emergency packs, protective clothing, and so forth.

The Schermuly Pistol Rocket Apparatus, Ltd., Spa Works, Newdigate, Surrey (Stand 98) exhibit a wide range of pyrotechnic equipment, including ground-to-air control flares of up to 1 million candlepower; aircraft emergency landing flares of up to 400,000 candlepower; ground flare landing units of 150,000 candlepower; search and rescue flare units; dinghy and other distress signals; Very cartridges; and smoke puffs.

Siebe, Gorman and Co., Ltd., Tolworth, Surbiton, Surrey (Stand 12) show parachute oxygen equipment, and life jackets of Mae West type to the company's own and B.O.A.C. designs, in addition to various types of safety belts and harnesses.

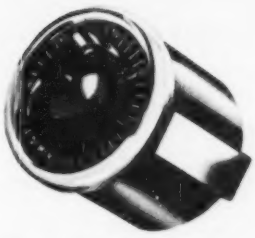
FIRE PREVENTION

The Graviner Manufacturing Co., Ltd., Poyle Mill Works, Colnbrook, Bucks (Stand 63), last year exhibited their new explosion-suppression equipment, and this year they have introduced a new magnetic-type, re-setting fire detector which, weighing but 2½oz, has a fire detection time of approximately 0.5sec. Incorporating an extremely small screened magnet, the movement of which is controlled by the Curie point of a heat-sensing element, this unit presents an entirely new approach to the aircraft fire-detection problem. The company are also showing an entirely new type of skin-deformation switch to complement their range of inertia switches, and thus actuate crash fire protection and survival equipment when an aircraft makes a belly landing, even if the g resultant is exceptionally small. Another exhibit is a triple outlet head, especially designed for the Comet, and constituting what is believed to be the lightest flight- and crash-fire protection apparatus ever devised for an aircraft of this size.

The Pyrene Co., Ltd., Grosvenor Gardens, London, S.W.1 (Stand 35), are exhibiting a smoke detector which gives warning of fire in baggage and other sealed compartments; examples of dual-head CO_2 systems; a new-type continuous flame detector, developed for the M.O.S. to give instant warning of fire in power plants; methyl-bromide pressure-type and Pyrene pump-type extinguishers; the new "wet water" one-quart, lightweight, pressure-operated extinguisher for aircraft cabin use; and the CDT 212A extinguisher trolley for engine-starting fire protection.

AUXILIARY ASPECTS . . .

Venner Time Switches, Ltd., Kingston By-Pass Road, New Malden, Surrey (Stand 166), are exhibiting their Type TDS/359 time-delay switch, especially designed for use in aircraft fire-extinguisher systems, and with this are also showing the Type TDS/HP which functions as a battery crash switch.



Venner process-timer timing switch.

FUEL TANKS

Delaney Gallay, Ltd., Vulcan Works, Edgware Road, London, N.W.2 (Stand 79), in addition to their work in the heat exchanger field, also manufacture specialized fuel tanks in a variety of light alloys.

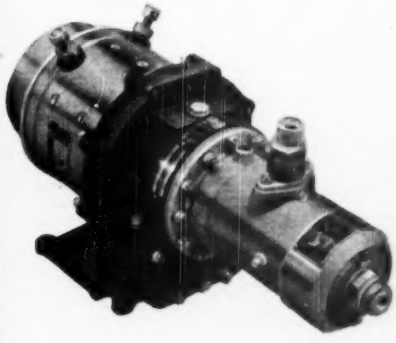
Fireproof Tanks, Ltd., The Airport, Portsmouth (Stand 14), are showing typical examples of their range of flexible fuel tanks, as well as exhibits of new grades of tank sheeting materials, designed to withstand temperatures down to – 70deg C. In addition to this, other exhibits include tank fittings, and synthetic rubber mouldings, flame-proof and crash-proof coverings, synthetic rubber sealing rings and vibration-damper blocks, which are impervious to petrol, oil and water. The company have also developed a lightweight covering which is available in a range of stiffnesses according to the degree of tank support required.

Marston Excelsior, Ltd., Fordhouses, Wolverhampton (Stand 39), exhibit samples of Flexsyn material as used in the manufacture of the company's Flexelite tanks, and display a representative tank (as installed in the Chipmunk), and examples of typical fittings. A demonstration panel illustrates the elasticity of Flexsyn material, whilst a typical carton pack containing a Flexelite tank shows the ease with which these units can be stored and transported.

HYDRAULIC EQUIPMENT POWERED CONTROLS AND UNDERCARRIAGES

Automotive Products, Co., Ltd., Tachbrook Road, Leamington Spa (Stand 13), have as their principal exhibit a demonstration of the Lockheed Servodyne, and also show the new S.B.A.C. standard pressure-fuelling coupling. This consists of a self-sealing coupling which is fitted to the fuel tank, and a blanking cap with a self-locking device. A standard hydraulic power circuit, consisting of a Mk 7 pump, an accumulator and automatic cut-out valve, is also shown, together with a range of Lockheed valves and jacks, oleo pneumatic shock absorber struts, arrester-hook equipment, steerable nosewheels, Lockheed-Avery hoses, self-sealing couplings and Purolator metal element filters.

British Messier electro-hydraulic pump and motor unit.



Boulton Paul Aircraft, Ltd., Wolverhampton (Stand K), have on their stand a selection of photographs illustrating, among other things, their high-fidelity electro-hydraulic powered controls, and oleo pneumatic undercarriages.

British Messier, Ltd., Cheltenham Road, Gloucester (Stand 72), are showing a large nose-undercarriage for twin wheels; a tailwheel unit for the new Percival trainer; a 16-in wheel, complete with disc-type brake and a 30 by 6.6in Firestone tyre inflated at 150lb/sq in; Perspex models of the 4,000lb/sq in hydraulic pump, an electro-selector and a hydraulic motor; a selection of hydraulic jacks; an undercarriage uplock; a sectioned working model of the Messier jack internal lock; a variable stroke pump; and an interesting working display of the "Flow-Equaliner" which distributes flow equally to each jack, both during feed and return.

Dowty Equipment, Ltd., Arle Court, Cheltenham, Dowty Equipment of Canada, Ltd. (Stand 144), and *Dowty Seals, Ltd.* (Stand 146).—The parent company is showing a complete set of undercarriages for a Swiss aircraft; undercarriage units for the Avro 706; and a sectioned unit of the Bristol Freighter main undercarriage. Another exhibit is an electrical panel, comprising the Dowty undercarriage indicator, button switches, engine-priming switch, and the "blinking eye" magnetic indicator designed chiefly for use in connection with fuel systems. Also on the stand is a model wing, the flap of which is operated by a lever and drum switch to demonstrate the stepless-type control system. On an outside stand is displayed a complete undercarriage for the Brabazon. The stand of the Canadian company exhibits a complete undercarriage set for the Avro Canada CF-100 fighter, while Dowty Seals, Ltd., display selections of various types of special seals for hydraulic and fuel-line use, together with other sealing components mentioned in our accessory review last week.

Dunlop Rubber Co., Ltd. (*Aviation Division*), *Holbrook Lane, Foleshill, Coventry* (Stand 91) display examples of the new serrated ribbed tyre tread, which is available in a wide range of sizes; the plate-type brake which, either with hydraulic or pneumatic operation, is designed to give maximum energy absorption without overheating; the Mk 3 hydraulic brake control designed for pedal operation from rudder control; and the newly-developed Maxaret unit, designed to give automatic braking. Various silicone products, including seals and couplings, are also shown. The Brabazon undercarriage, which is displayed on an outside site in conjunction with Dowty Equipment, Ltd., is fitted with Dunlop tyres, wheels and brakes.

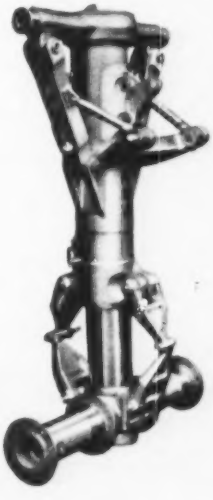
Electro-Hydraulics, Ltd., Liverpool Road, Warrington, Lancs (Stand 106) are exhibiting a complete physical layout of a typical aircraft hydraulic system; a working model of a multi-wheel retractable undercarriage; a demonstration system for powered flying-controls; and representative examples of the company's wide range of hydraulic components, including jacks, solenoid-operated valves, selectors and so forth.

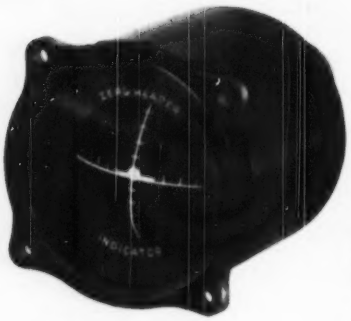
Exactor, Ltd., 108, *Park Street, London, W.1* (Stand 53) show examples of the well-known Exactor hydraulic remote control, which is suitable not only for engine applications, but also for auxiliary services such as landing lamps, cooler shutters, radar, and so forth.

The Fairey Aviation Co., Ltd., Hayes, Middlesex (Stands D and 95) exhibit the Hydro-Booster, a power servo unit for application to flying controls, which is specified for a large number of first-line aircraft. Undercarriage shock-absorber units are also displayed, together with arrester-hook hydraulic dampers, designed and manufactured by the company.

Girling, Ltd., Tyseley, Birmingham (Stand 107) are showing, among examples of their hydraulic brakes for light- and medium-weight aircraft, the two-leading-shoe self-adjusting hydrastatic brake, the design of which enables

Main undercarriage leg for Hermes aircraft, by Electro-Hydraulics, Ltd.





Sperry Zero Reader indicator.

very small master cylinders to be used. Together with these exhibits are displayed a fluid supply tank designed especially for aerobatic aircraft, and the Girling hand-parking control.

The Goodyear Tyre and Rubber Co., (G.B.), Ltd., Wolverhampton (Stand 23) exhibit a variety of tyres and wheels; a selection of tyre sections, showing the construction of Goodyear aircraft tyres; a photograph of the new Hawker brake, together with cut sections showing the assembly of pistons, seals, adjusting pins and so forth; and a display in expanded form of the 6.00-6 cross-wind assembly.

H. M. Hobson, Ltd., Fordhouses, Wolverhampton (Stand 71) show units and working models of powered flying controls, both of the piston-jack and screw-jack type, in each of which hydraulic or electro-hydraulic forms of actuation are available.

Integral, Ltd., Cousins Street, Wolverhampton (Stand 52) have on view examples of the company's normal range of engine-driven hydraulic pumps for general services from 800 to 4,000 lb/sq in; electro-hydraulic units for airscrew feathering and other special duties; a selection of piston-operated control and sequence valves and, in connection with powered controls, a hydraulic pump specially designed to take the maximum amount of work from an electric motor, and a hydraulic motor operated from the pump. In this connection, a working model of the hydraulic motor is displayed to illustrate the valve operation.

The Palmer Tyre, Ltd., Herga House, Vincent Square, London, S.W.1 (Stand 65) show examples of tyre, wheel and brake assemblies, including tyres with a new form of ribbed tread, wheels of the latest split or detachable-flange type, and brakes of disc-, bag- and mechanically operated kinds. Of these last mentioned, the disc-brake is fitted to a still-secret jet aircraft, whilst the bag-type brake is of a new and unconventional design giving high kinetic energy absorption.

The Plessey Co., Ltd., Ilford, Essex (Stand 86) are exhibiting a new type of aircraft hydraulic pump, which has recently been developed.

Vickers-Armstrongs, Ltd., Vickers House, Broadway, Westminster, London, S.W.1 (Stand 1) include in their range of aircraft accessories a variety of valves and cocks, mentioned in our review of accessories on Aug. 31. In addition, a Vickers undercarriage leg is displayed.

INSTRUMENTS

Kelvin and Hughes, Ltd., New North Road, Barkingside, Essex (Stand 3) is the parent company of *Kelvin and Hughes (Aviation), Ltd.*, of the same address (Stand 2), which latter company combines the original firms of Henry Hughes and Son, Ltd., and Kelvin, Bottomley and Baird, Ltd. On the Kelvin and Hughes (Aviation), Ltd., stand is exhibited a wide range of aircraft, meteorological and test instruments, including altimeters up to 70,000ft range and the newly-developed wrist-type altimeter; dual helicopter tachometers; high-range machmeters; air-speed indicators; rate-of-climb indicators; sensitive pressure gauges; engine tachometer generators; hand anemometers; and precision barometers.

Kelvin and Hughes, Ltd., exhibit navigation instruments and test equipment, including gyro-magnetic compasses; liquid compasses; air sextants; periscopic sextants; turn and slip indicators; gyros; plotting instruments, automatic DR navigation instruments, and computers.

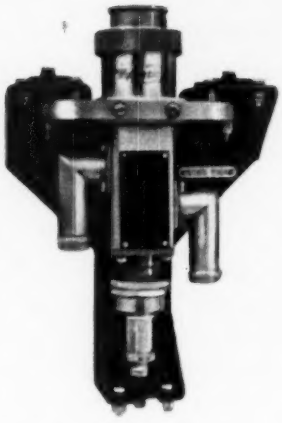
Salford Electrical Instruments, Ltd., Silk Street, Salford 3, Lancs (Stand 59) are showing various types of quartz crystals; a radio altimeter for giving instantaneous height above terrain; and radiosonde meteorological telemetering airborne and ground equipment.

Sangamo Weston, Ltd., Great Cambridge Road, Enfield, Middlesex (Stand 19) exhibit a range of Weston electrical measuring instruments, designed for application in navigational systems, electrical power indication, and temperature and movement measurement. The new model S 122 pressure-transmitter is exhibited, together with relays, thermocouples and thermometer bulbs, and dual ratiometer indicators.

Simmonds Aerocessories, Ltd., Treforest, Glam (Stand 57) include on their stand a working model of the Pacitor electronic fuel-contents gauge, the chief feature of which is that the dial readings remain constant irrespective of aircraft attitude. A Pacitor controller unit is also shown, and this enables two tanks to be discharged at the same speed or at any required ratio in order to maintain the aircraft c.g. at the optimum position.

Smiths Aircraft Instruments, Ltd., Cricklewood, London, N.W.2 (Stand 1) exhibit, among the examples of the wide range of instruments for which the company is famous, four specially developed instruments, designed for use in pressurized aircraft, viz., cabin rate-of-climb indicator, cabin height indicator, cabin differential pressure gauge and cabin air thermometer. In addition, the Type 4 DI/F ice detector head is shown, together with the component elements of the Smiths-Waymouth fuel contents gauge system, and a complete SEP 1 autopilot installation.

Sperry Gyroscope Co., Ltd., Brentford, Middlesex (Stand 158) have on their stand various examples of the well-known Gyrosyn compasses; component parts of the new British-designed and manufactured Zero Reader flight indicator; the new HL 5 electric gyro horizon; the HL 4 helicopter air-driven gyro horizon, and the modified AL 1A version of the lightweight Gyropilot for light and medium aircraft.



Hymatic G-suit Anti-G valve.

PNEUMATICS

The British Thomson-Houston Co., Ltd., Rugby (Stand 117) show the Type H leak detector, developed for use in conjunction with aircraft pneumatic systems. Operation of the detector is dependent upon the introduction of I.C.I. Arcton 6 tracer gas into the system, and the sensitivity of the instrument is such that leaks passing air at the rate of 0.5 c.c./minute with a tracer concentration of 1 per cent or less, may readily be detected.

Dunlop Rubber Co., Ltd., Holbrook Lane, Foleshill, Coventry (Stand 91) show a three-stage supercharged 3,000 lb/sq in air compressor which is especially suitable for jet aircraft; a steel spherical air-storage bottle for use in high-pressure pneumatic systems; and various representative examples of electromatic valves, jacks, reducing valves, air filters, and so forth.

Electro-Hydraulics, Ltd., Liverpool Road, Warrington, Lancs (Stand 106) to complement their work in the hydraulic field also design and manufacture complete pneumatic systems and pneumatic and electro-pneumatic components.

The Hymatic Engineering Co., Ltd., Redditch, Worcs (Stand 132) feature a panel illustrating a 1,000 lb/sq in generating system, including the new S. 50.U compressor, a regulator, ground-charging valve, oil and water trap, and air storage bottle, this display being connected to the company's recently developed anti-g system, which includes a shut-off valve, reducing valve, air filter, and the anti-g valve itself, which latter is demonstrated by a "working" dummy in a pressure suit. Together with a working model illustrating the operation of the electro-pneumatic multi-position control for such services as flaps and dive-brakes, a display of storage bottles and rams is featured to illustrate the weight and bulk savings as a result of the use of higher pressures, and a representative selection of valves for manual and automatic operation is also included.

The Palmer Tyre, Ltd., Herga House, Vincent Square, London, S.W.1 (Stand 65) show representative examples of their wide range of rams, reducing valves and differential brake controls.

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From all Quarters

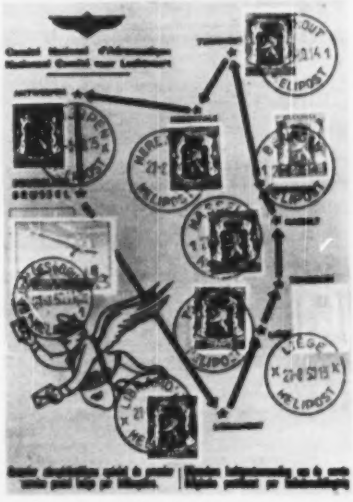
At North Weald : A.V-M. T.G. Pike welcomes the Royal Swedish Air Force Vampires.

Col. Ahmansson of the Swedish squadron takes the salute. With him are A.V-M. Pike, and Col. N.M. Von Arbin, Swedish air attaché.

B.O.A.C. Constellation *Bristol* at Limatambo Airport, Lima, Peru, on a proving flight by Capt. Gordon Storr. Early next month a service will begin between London and Santiago, Chile, via Nassau, Kingston, Panama and Lima.

(Left) W/C. Alan Boxer, New Zealand-born R.A.F. pilot, who is serving with the American 92nd Bomber Group over Korea. (Right) Dusting marginal land in Wales with fertilizing mixture from a Bristol 170 Mk 31. "Flight" photographs.

(Below) In Australia House, Tokyo: Air Marshal George Jones, R.A.A.F. chief; Mr. R. G. Menzies, Australia's prime minister; Lt. Gen. Sir Horace C. H. Robertson, C.-in-C. British Commonwealth Occupation Forces; and Col. W. R. Hodgson, head of the Australian Mission and U.K. member of the Allied Council in Japan.



Souvenir of the first helicopter mail service run by Sabena from Brussels. (Below) The Tipsy Belfair recently broke a light-aircraft distance record, as reported on p. 288.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Radar Technicians

BEARING in mind some of my war-time radar experiences, I have several times recently wondered if the Air Ministry have enough personnel in the field of R.D.F. servicing to contend with any emergency that may arise.

It has been with interest, and a certain amount of admiration for the Army authorities, that I have noticed that A.A. Command have been and are advertising for civilian radar mechanics, the position carrying a reasonable salary.

It is unfortunate that the pay offered by many radio manufacturers and repair organizations is poor compared with other forms of available employment, for electronic equipments are increasing, and men are quitting this very necessary profession in order to obtain better pay.

There must be many who remember and are still interested in R.D.F. and its complexities and, therefore, here then is a possible source of semi-trained technical man-power.

T.R.E. and its research workers no doubt cover much ground, but I am primarily thinking of detection ground stations and squadrons.

I trust that the regulars in this field will grow efficient and large in number, bearing in mind the speed of jets, and the force of atomic energy.

J. SMALLWOOD.

Birmingham.

Post-War Air Racing

THE article on air racing, by Miss Winifred Brown, in *Flight* of August 24th, raises a number of important points. But are her answers to current problems always practicable under present-day conditions?

It is suggested that races should be longer. However, very few enthusiasts could afford to maintain specialized racing aircraft even if they existed, and clubs and private owners cannot run the risk of "flogging" engines for such long periods, especially as many machines must earn their meagre keep by pressing on with circuits and bumps throughout the year.

The question arises, also, of whether a longer course is more enjoyable for either competitors or spectators. From the latter's viewpoint, it is very pleasant to have the start and finish on one airfield, with pylon turns laid on to maintain interest. For a competitor, there is much enjoyment to be gained from being able to see one's rivals throughout most of the race, wondering whether there is a chance of catching the slower (you hope) aircraft that is just rounding the pylon in front.

What is needed is the revival of those races which reappeared for a year or two after the war and then faded into a peaceful oblivion—the Manx Air Derby, the Lympne Handicap and the Southend Trophy. However, let us have a closed circuit with the start and finish on one airfield, not a crawl along the coast to finish over a stretch of water inhabited only by unappreciative fish.

One final point, however, I agree with wholeheartedly, and that is the need for better prizes and bigger bar tents!

DAVID F. OGILVY.

Windsor, Berks.

Four-engined Pioneering

I HOPE Mr. Peter Masefield will forgive me if I take up one or two points in his letter (August 24th) dealing with the *Hannibal* and *Heracles*. In that letter Mr. Masefield says "... Imperial Airways inaugurated the world's first four-engined commercial air service. . ." This is an oft repeated error and I think it would be well to place on record the fact that at least three airlines had introduced four-engined equipment earlier than the Imperial Airways service of June 11th, 1931.

Société Générale de Transports Aériens (the Farman Line) from February to April, 1926, took delivery of four Farman Jabiru 9-passenger monoplanes. These were registered F-AIAN, F-AIAU, F-AIBU and F-AIBT, their works numbers were 2, 3, 5 and 4 respectively and each had four Hispano-Suiza motors. On May 12th, 1926, S.G.T.A. opened its Paris-Cologne-Hamburg-Copenhagen route and I believe this type was used from the beginning. At least one four-motor Jabiru visited Copenhagen in 1925.

In May, 1926, D.D.L. (Danish Air Lines) took delivery of two Farman Jabiru four-engined aircraft T-DOXB and T-DOXC. Later the same year the Danish Orlogsvaerftet built and delivered two more of these aircraft to D.D.L.—they were T-DOXD and T-DOXF. These aircraft were used on the Copenhagen-Hamburg service and they bore the names *Jylland*, *Fyn*, *Sjælland* and *København*.

In 1930 in the United States Western Air Express introduced a fleet of 32-passenger Fokker F-32 four-engined aircraft on its Los Angeles-San Francisco route.

The statement that all the *Heracles* and *Hannibal* aircraft with the exception of *Hannibal* and *Hengist* were scrapped is not quite true. The details of these were:—

G-AAGX *Hannibal*. Lost between Jask and Sharjah March 1st, 1940.

G-AAUC *Horsa*. Delivered to the R.A.F. (May 31st), 1940.

G-AAUD *Hanno*. Damaged by a gale at Whitchurch and written-off March 19th, 1940.

G-AAXC *Heracles*. As G-AAUD.

G-AAXD *Horatius*. Wrecked in force landing at Tiverton November 7th, 1939.

G-AAXE *Hengist*. Burnt out in hangar at Karachi May 31st, 1937.

G-AAXF *Helena*. Delivered to the R.A.F. June 8th, 1940, and later dismantled at Donnibristle.

I have been unable to trace the fate of G-AAUE *Hadrian* and would appreciate any information which readers may have, together with any details of the ending of the Short L.17 *Scylla* and *Syrinx* which shared the London-Paris and London-Brussels routes with the H.P.s.

JOHN STROUD.

London, W.14.

Enthusiasm *Not* Discouraged

MAY I ask for the hospitality of your columns once again in order at least to modify, in the light of subsequent experience, my letter in your issue of August 24th? Since that letter was sent to you I have had a reply from the R.Aux.A.F. squadron concerned, and have at their suggestion visited them at their airfield. I now feel convinced that the delay in answering my letter was due to quite good reasons, such as sending for my documents and awaiting their arrival. I left the unit feeling that, far from anything being wrong with it, it is a very fine part of a fine force. Unfortunately for me, however, the amount of training required (far in excess of what Air Ministry Pamphlet 33 lays down) is beyond what I am able to undertake at the present time, though I hope to be able to devote the number of hours required within the near future.

A. S. BOLTON.

London, N.7.

Sources of Subsidy

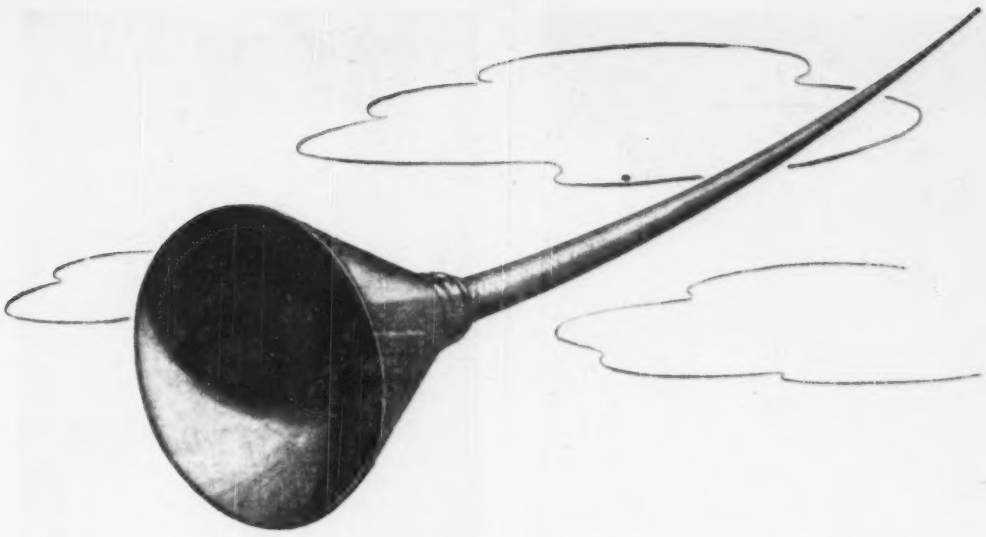
IN the article by Ann Douglas in your issue of July 27th are some points upon which I should like to express a few thoughts. The writer bemoans the fact that the British team in the International Gliding Contests did not show up well and implies that gliding being unsubsidized was one of the causes! Power private flying people have also bemoaned the same fact and your excellent paper has to a fair extent supported this view. Now, surely there's one important point missed by all these "Mona Lotts," i.e., subsidizing costs money, that money must come from the Treasury, the Treasury must collect from the taxpayer's pocket—not only does the industry have to pay up but also thousands of fixed-wage earners *via* P.A.Y.E. Why should this latter section of the community have to support the sport of a few, particularly when that few can get their flying in the R.Aux.A.F. *and* be paid for it! There is, after all, plenty of wealth in the aircraft industry—judging by the company reports—so let's see what "private enterprise" can do.

H. E. NORMAN.

Dursley, Glos.

FORTHCOMING EVENTS

Sept.	15.	Battle of Britain Day.
Sept.	16.	R.A.F.: "At Home" Day.
Sept.	16.	Daily Express International Air Race, Hurn Airport, Bournemouth.
Sept.	17.	Air League (Portsmouth Branch); Air Display.
Sept.	19.	Aero Golfing Society: Autumn Meeting (Cellon Cup) Sudbrook Park.
Sept.	23.	Unveiling of Air Transport Auxiliary Plaque in St. Paul's Cathedral.
Sept.	23.	Bristol and Wessex Aero Club and Airways Flying Club: Garden Party, Whitchurch.
Sept.	24.	Association of British Aero Clubs and Centres: Summer Convention, White Waltham.
Dec.	16.	Institute of the Aeronautical Sciences: Fourteenth Wright Bros. Lecture, Washington, D.C.



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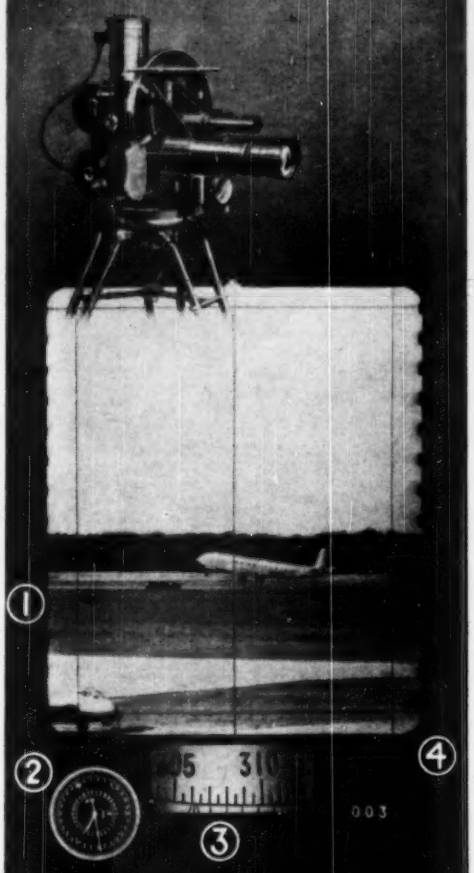

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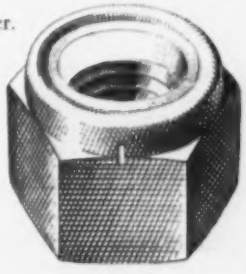

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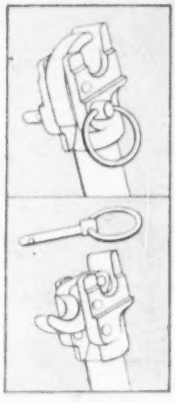

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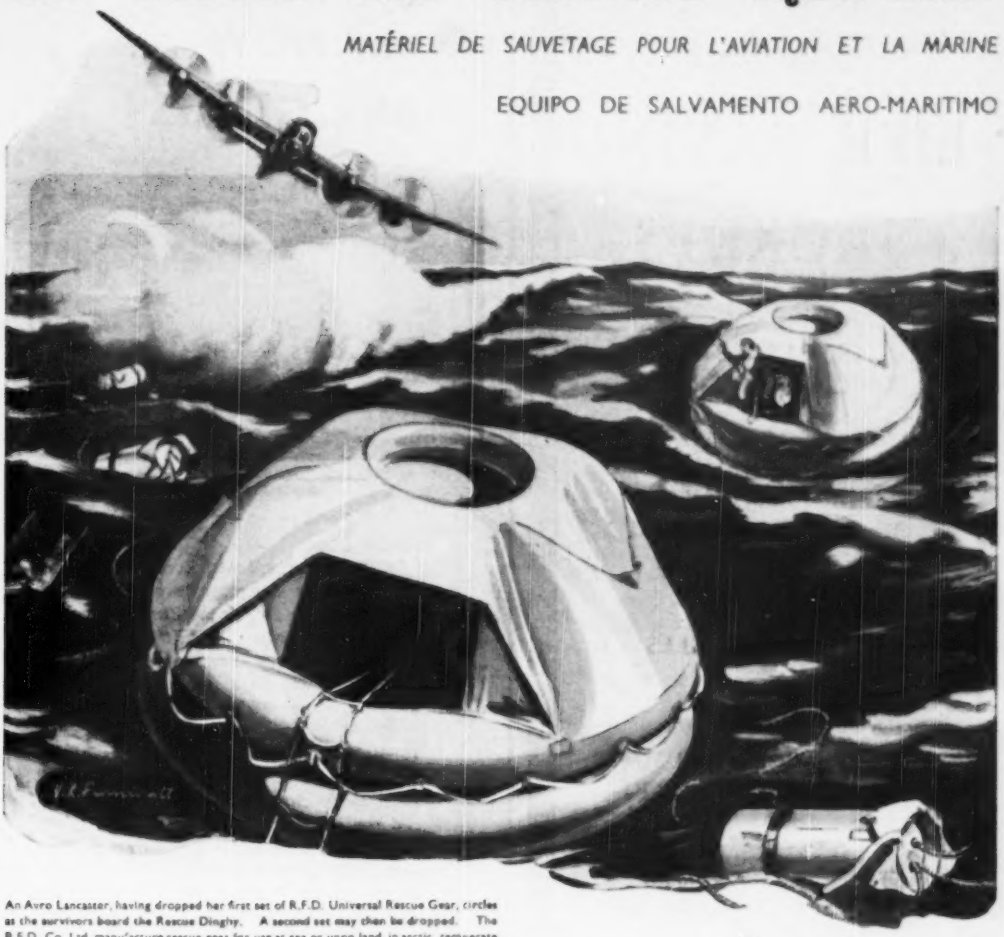

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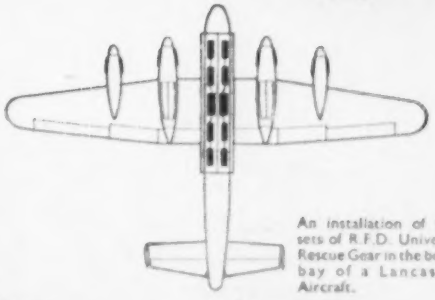

An installation of two sets of R.F.D. Universal Rescue Gear in the bomb bay of a Lancaster Aircraft.

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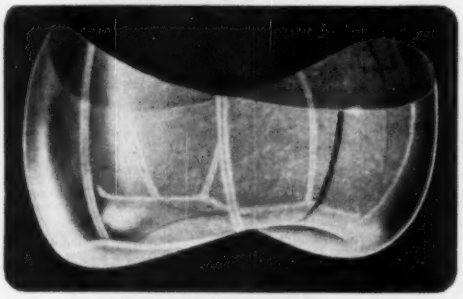

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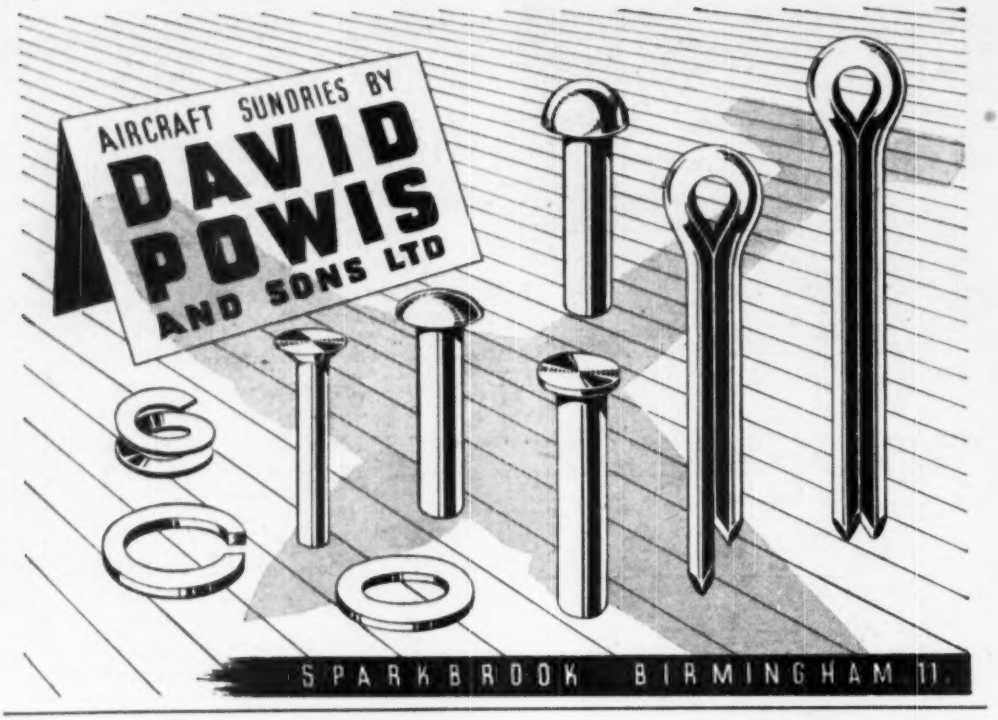

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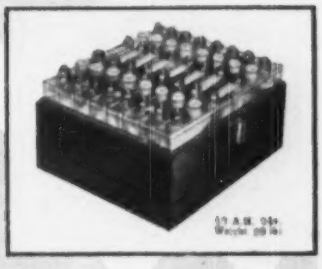

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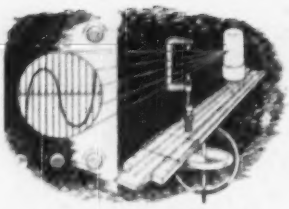

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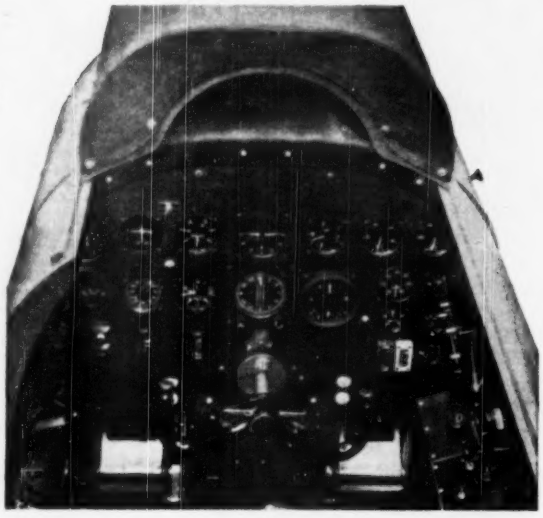

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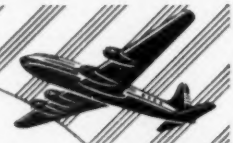

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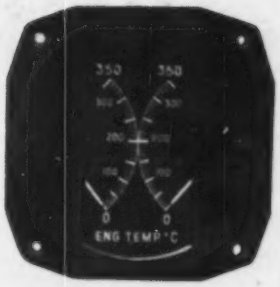

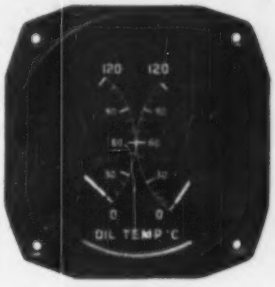

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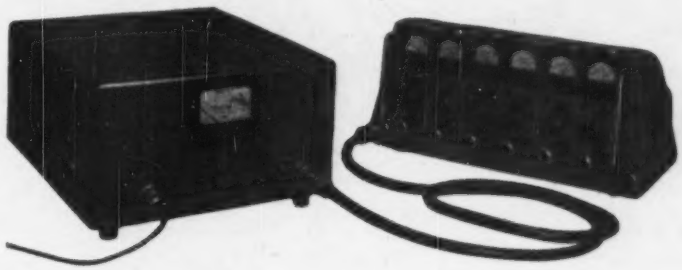

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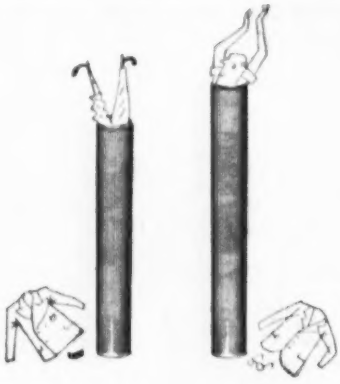

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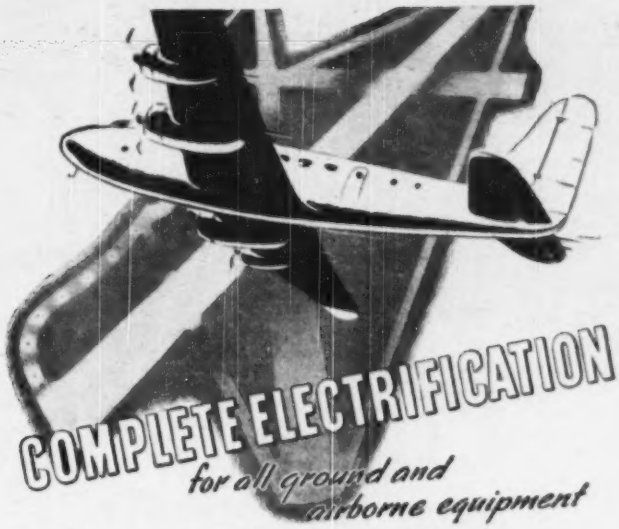

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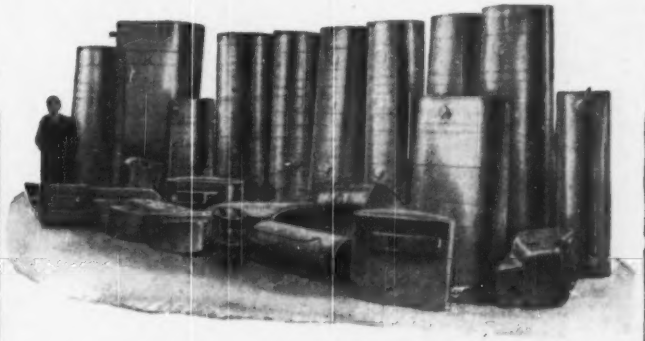

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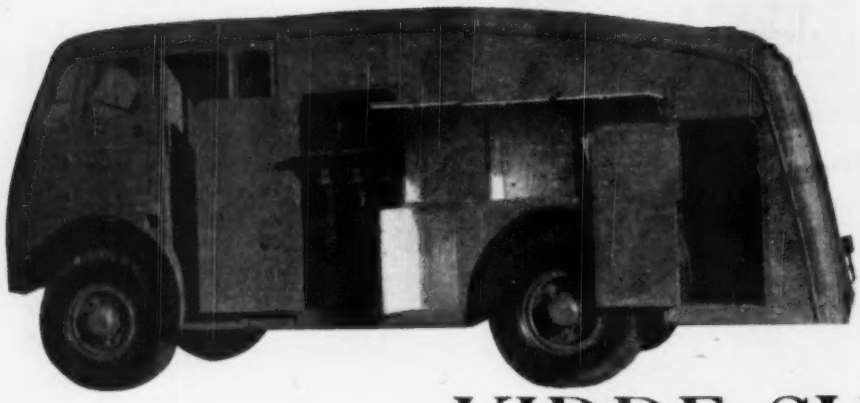

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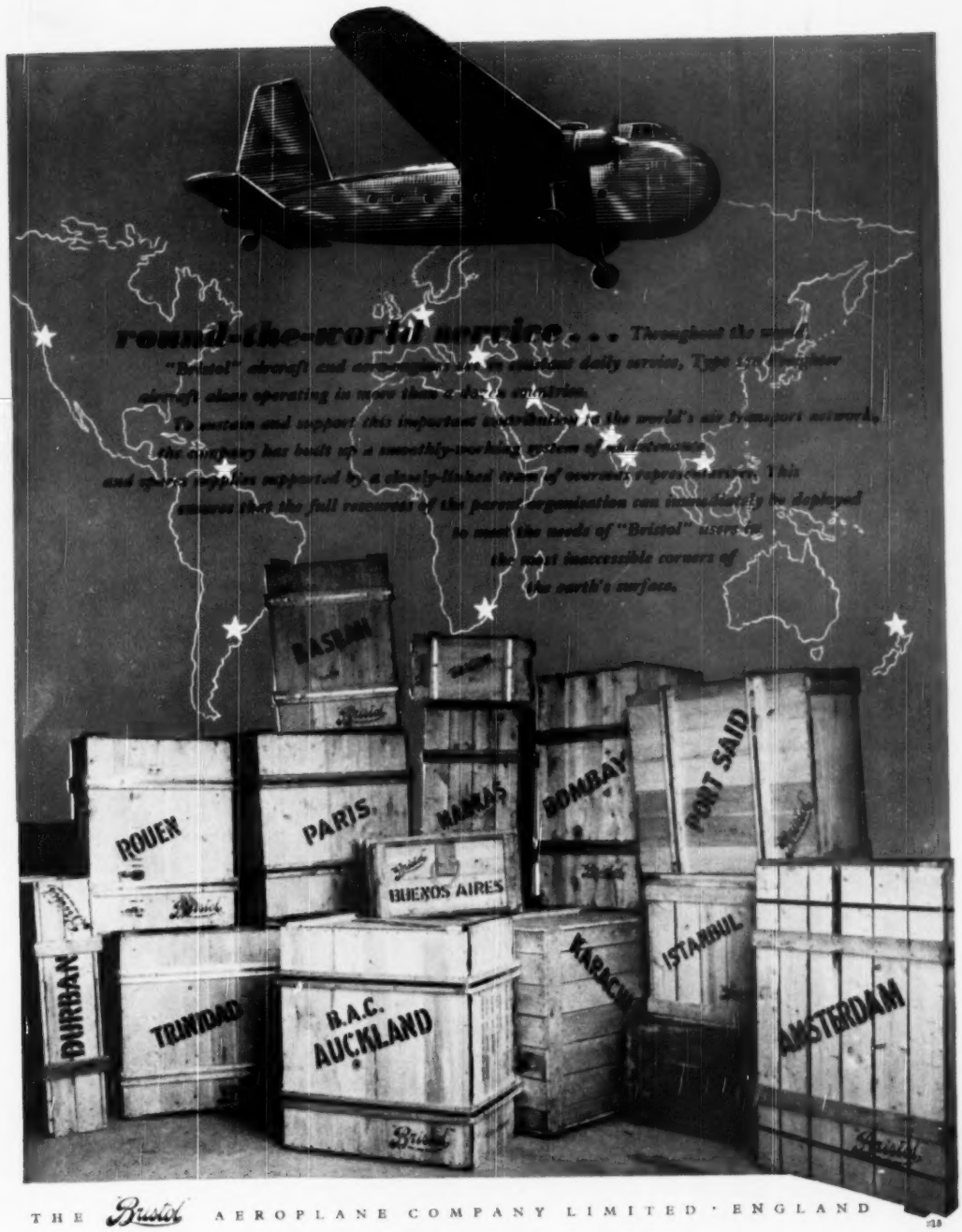

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